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AUTOMOTIVE INDUSTRIES
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What is the Future of Bus and Railway Cooperation?

Report of Committee on Motor Vehicle Information at recent A.E.R.A. convention raises question as to future attitude of railways toward bus development

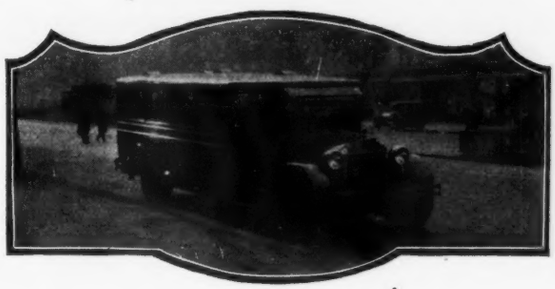
By Norman G. Shidle

PROBABLY no more interesting document has appeared for some time than the report of the Committee on Motor Vehicle Information brought in to the American Electric Railway Association at its recent Cleveland meeting. Not only for its specific conclusions, but for its general point of view as well, is the report worth careful study by all those commercially interested in developing the use of motor vehicles to the fullest extent of their economic possibilities.

At a time when bus makers in general seem to feel that their industry still is in its childhood—or at least in no more than its early adolescence—it is interesting to note that this committee anticipates "Some further expansion of buses in our industry for a while to come but *a comparatively early arrival at a point of approximate saturation.*"

While several interpretations, probably, could be put upon this statement, it would seem that the bus manufacturing industry as a whole wouldn't have any brilliant nor striking growth ahead were it to mold its merchandising and marketing plans too carefully along the lines desired by a group of purchasers whose needs, according to their own estimates, will be practically filled before long.

It is worthy of note, on the other hand, that 29 more electric railway companies are operating buses now than were listed as operators in September, 1926, while the total number of buses being operated by electric lines has risen from 6556 to 8352 during this same period.



There is some danger, to be sure, in generalizing too much from the specific, and the attitude of every individual electric railway operator undoubtedly is not exactly that expressed by this report; some particular companies probably have quite divergent opinions. *AERA*, the publication of the association, for instance, reflects a bit different approach to the problem when, discussing the figures just quoted, it states that "these figures indicate that the number of buses and the miles of route operated by those companies that have already adapted the bus to their transportation systems are continuing to increase with considerable rapidity."

That so important an electric railway representative as W. H. Sawyer, last year's president of the A.E.R.A., sees a growing future for the motor bus is indicated by the statement made in his address to the recent convention to the effect that, "I see new developments ahead in the application of the bus as a transportation vehicle, whereby it will expand its present usefulness. The bus has made a strong appeal. It has been a helpful object lesson in many ways, but the bus of the future will tend to embody the desirable features of the electric car just as the electric car has absorbed desirable features of the bus."

Throughout the particular report referred to, nevertheless, seems to be reflected a tendency to regard buses as something

to be used only in case existing forms of transportation can't possibly be made to function satisfactorily; certainly no great desire to utilize the maximum possible economic values of the bus in indicated.

Even so, however, the steady progress of the bus seems to be reflected in some phases of the report. While stating clearly as a consensus of opinion among street car executives that new buses put on by electric railways this year will function largely as feeders and supplementary units, the report does say "Only in small cities does there appear to be any intention of supplanting street cars with buses." Thus, it would appear, a tendency toward bus use to replace street cars is, in some cases at least, admitted.

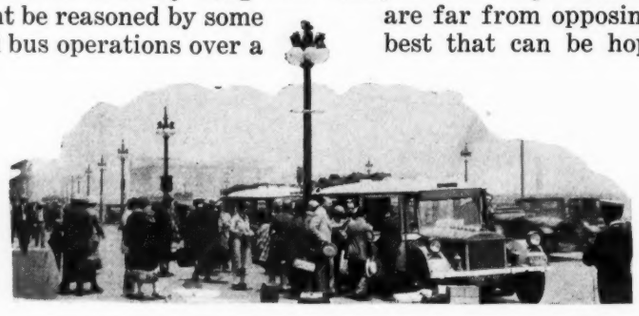
Impressive Phraseology

That part of the report relating to the operation of buses by independent companies is impressive in its use of words and phrases such as "competition," "checked," "checking the increase in competition," "reports are encouraging," etc.; phraseology and viewpoint most of which is generally associated with a group engaged and interested primarily in a contest or a fight rather than with a group interested primarily in study and development of the most efficient and economic form of transportation for the American public.

This particular part of the report, as a matter of fact, has a tenor which seems somewhat at odds with the official change just made in the constitution of the A.E.R.A. which makes it possible for entirely independent bus operators to become members of the association and, presumably, participate in its activities on an equal basis with other members.

Particularly disturbing to the committee seems to be the fact that even though the electric railways have proved by arguments, and, apparently in their own operations, that buses frequently can't be operated profitably and economically, a lot of independent bus operators seem to be making a good go of it in many instances. "Another respondent," the report states, "finds railways' operation of buses unprofitable, but independent interurban service making a good return." He attributes this condition, the report continues, "to the use of the bus by railways in developing new territory."

Later on, it is claimed by the report that the independents use buses which are in poor condition and thus have secured extraordinarily long life from these buses. It might be reasoned by some of those who have studied bus operations over a period of years that a bus which was "run to death" without proper care and repair would be a far more expensive proposition in the long run; it might be thought that operators actually carrying out this practice would wreck themselves financially before long. Not so, however, if the facts developed by this report are accurate, since the committee finds the replies to its questionnaire "with appropriate uniformity reflect tenacity in the independent operators and an ability, with the aid of time payments, to replace their equipment."



Something verging on a paternalistic attitude toward the bus manufacturer seems to be reflected in that part of the committee's report which refers to answers to their questionnaire relating to the question, "Are bus manufacturers soliciting business in competition with electric railway operated lines? If so, who?" In stating its conclusion on this point the committee uses phraseology which might be interpreted as coming from a body sitting in judgment on another group. The committee, in the language of the report, "exonerates the bus manufacturers from the implication of undue efforts to establish independent competitive operations." A few of those replying to the questionnaire, mentioning five bus manufacturers in all, feel that the latter "have not shown indications of sincere cooperation and have lent financial assistance considerably beyond the general practice of extending time payment accommodation to established independent competitive bus operations."

As a matter of viewpoint, also, it is interesting to note that, following these various trends and tendencies, outlined in the report itself, one of the later conclusions is that "we find the expectation that bus operation in the future will tend to become concentrated largely under the management of the electric railways and the anticipation that the continued increase in the use of private automobiles will have the greatest bearing upon future bus operations." This statement is particularly interesting when read in connection with the earlier one that a saturation point for bus use by electric railways is not far off.

As Has Been Said Before

It may be pertinent, indeed, to quote again the following paragraph from the article which appeared in *Automotive Industries* of Jan. 22, 1927:

"It has become increasingly apparent to those interested in promoting the use and sale of motor buses that maximum utilization of such vehicles is unlikely to be reached by leaving to agencies fundamentally opposed to their use the determination of where they are and where they are not suitable. While a good many railway men today recognize fully the useful potentialities of the motor bus and are far from opposing its use in all cases, the best that can be hoped, even from this progressive wing of the rail interests, is determined to use buses where rail service is unprofitable or where rail service simply cannot meet the public demands for service."

Two-passenger closed-cabin plane which has just been placed on the market by the Central States Aero Co. It is priced at $2,375

"Monocoupe" is Introduced

New plane for private use has body designed along automobile lines. Fitted with 75 hp. engine and does 100 m.p.h.

By A. F. Denham

A VERY interesting two-passenger closed cabin monoplane for private use, called the "Monocoupe," has been announced by the Central States Aero Co., of Davenport, Iowa. Although equipped with a modern engine, this plane lists at only $2,375 at Davenport, at which price it compares not unfavorably with the price of planes powered with antiquated OX 5 engines.

Its powerplant is the five-cylinder air-cooled "Air-Cat" engine manufactured by the Detroit Aircraft Engine Works. This engine, which develops 75 hp. at 2000 r.p.m. and weighs about 210 lb., places this ship in the neo-lightplane class. Its performance however is strictly in accordance with commercial plane standards and its inherent stability characterizes it as an extremely interesting development.

Fuselage is of welded steel construction of the Warren trust type with a sharp decrease in both width and depth immediately back of the two-passenger cabin, which has been designed to provide the maximum of room and comfort. Overall length of the fuselage is 16½ ft. including the engine mount. The cockpit itself is 32 in. wide, 43 in. high and 30 in. deep, and is upholstered in Ca-Vel. Pyralin windows are provided at the front and at both sides.

A door is provided on the right side with controls on the left, although double control is optional at extra cost. All fuselage tubing is 20-gage with the exception of the members which take the loads from the wing brace struts, landing gear and rudder posts, which are of 16-gage. Engine mounting is of chrome-molybdenum tubing, to which the steel engine mount plate is attached at four points by 5/16 in. nickel steel bolts.

Clark Y-section is used for the single unit semi-cantilever type wing which has a span of 30 ft. and a chord of 5 ft. Spars are of I-beam section spruce spliced in the center by a vertical cut having a slope of one in 12. Drag bracing is of the conventional type, No. 10 piano wire being used throughout. Ribs are of ⅛ in. basswood webs with spruce capstrips and lightened by rectangular holes in the webs. External bracing of the wings is by streamlined tubular chrome molybdenum steel struts, two on either side, attaching to the wings at slightly more than chord length from the wing tips and to the fuselage at a transverse tube to which also attaches the rear under carriage strut. The attachment of this fitting is by means of a long strap weld with a central vertical fin, to prevent it from bending under compressive loads. Struts are attached to the fittings by ⅜ in. nickel steel bolts.

Attachment of the wing to the fuselage is by means of four 5/16 in. nickel steel bolts passing through single lugs extending from the wing spars and a box fitting at the upper fuselage joints over the cabin. Wing covering is of stitched fabric with six coats of nitrate dope.

The undercarriage is of the conventional straight axle and spreader with rubber cord shock absorbers. It has a tread of 5 ft. 4 in. The tail skid is of steel tubing and of the full floating type.

Ailerons are of rectangular form directly attached to the main rear spar by three pin hinges, with the aileron area equal to 12½ per cent of the main wing area. All tail surfaces are of welded carbon steel tubing, fabric covered. Rudder and elevators are not balanced. Controls to all surfaces are of the conventional flexible cable and pulley type with stick control for elevator and ailerons and pedal control for the rudder. Standard equipment includes oil thermometer, altimeter, oil pressure gage, tachometer and clock.

High speed of the plane is given at 100 m.p.h., with a stalling speed of 48 m.p.h. Twenty gallons of gasoline give the plane a range of 400 miles at a cruising speed of 85 m.p.h., equivalent to 20 miles to the gallon. Overall length of the ship is 19 ft. 9 in., height 6 ft. 3 in. and maximum span is 30 feet.

A SOCIETE Franco-Belge des Camions Liberty has been organized in Belgium to deal in American Liberty trucks. The trucks referred to are evidently the Class B and other military trucks, the stocks of which were sold by the American to the French Government after the armistice. That there should still be sufficient business in these old war trucks to justify the formation of a new sales company nearly nine years after the armistice speaks well for their stamina.

Hercules Adds Line of 6-Cylinder Bus and Truck Engines

New design will be made in three sizes, all with same stroke but varying bores. Largest has 404.3 cu. in. piston displacement. Speed peak reached at 2400 r.p.m.

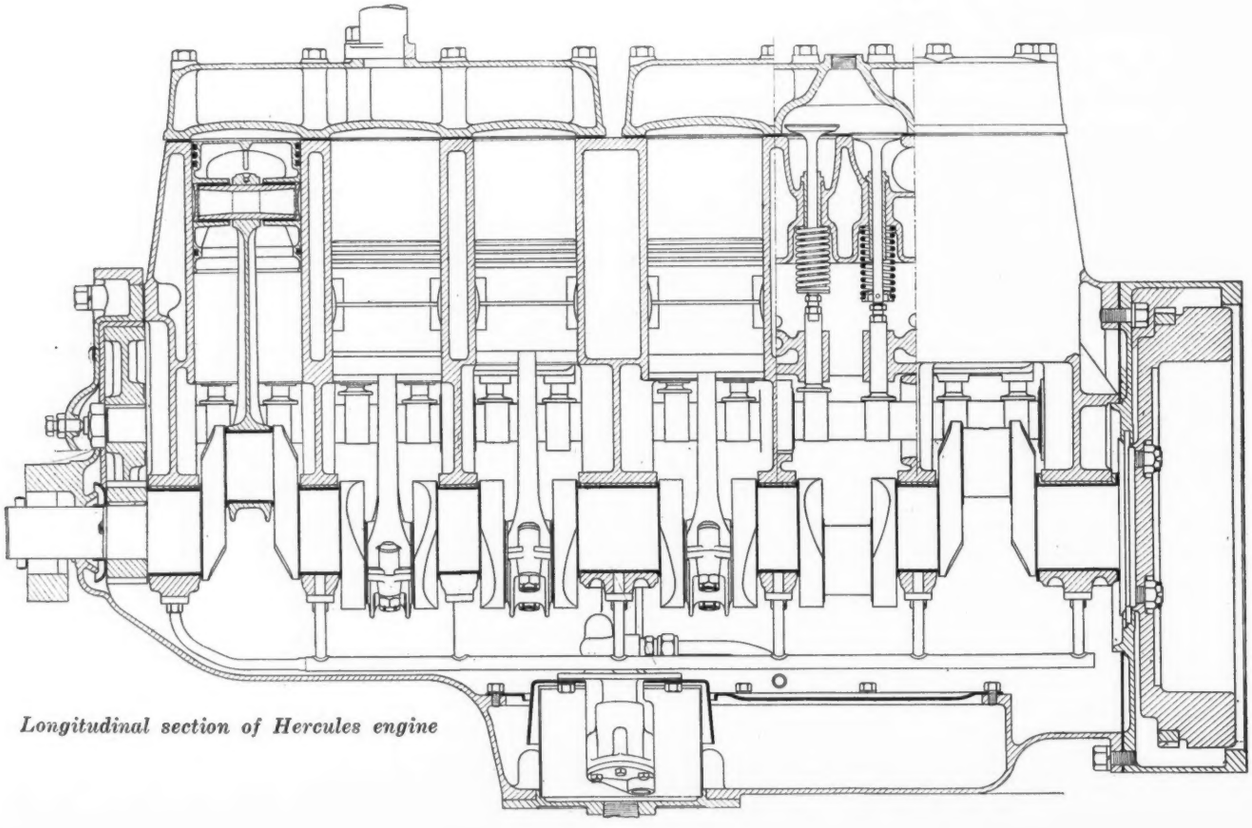
A SERIES of three six-cylinder L-head engines has been announced by the Hercules Motor Corp., of Canton, Ohio. These have bores of 3¾, 4 and 4⅜ in., and a common stroke of 4¾ in. All three engines are identical in their general design, and many of the parts are interchangeable, the only differences being in the sizes of the bores and in the dimensions affected thereby. The engines develop their maximum torque at 1100 r.p.m. and peak at 2400 r.p.m.

To meet present-day operating conditions of speed trucks and buses, special attention has been given to the cooling of the valves. Water is directed in a stream around each exhaust valve, this result being accomplished by a special design of the inlet header on the side of the block and of the passages in the cylinder. The top of the guide comes close to the head of the valve, thus bringing the jacketed portion of the guide near the valve head. The water pump is of improved design and is capable of an unusually high lift of the water column and of delivering 86 gal. per minute at 2000 r.p.m. and 46 gal. per minute at 1000 r.p.m.

The crankcase is integral with the cylinders and two separate heads are used. The design of the crankcase gives unusual rigidity. The jacket walls slope inward toward the top and are connected with the cylinder barrels at the bottom, thus adding to the lateral rigidity. The cylinders are casings of a nickel-alloy semi-steel containing 1½ per cent nickel. A minimum Brinell hardness of 200 is maintained.

The crankshaft is 3 in. in diameter at the main bearings, while the connecting rod bearings are 2½ in. in diameter and 1¾ in. long. The front main bearing is 2 in. long, the center and rear bearings are 3 in. long each, and the intermediate bearings are 1½ in. long each.

Pistons are of cast iron, with three rings above the pin on all three engines, and one ring below the pin on the two larger ones. A ring width of 3/16-in. is uniform



Longitudinal section of Hercules engine

throughout the series. The piston pins are of molybdenum steel and have a diameter of 1¼ in. They are locked in the rod by a clamp bolt and have bronze-bushed bearings in the piston.

Valves have a clear diameter of 1¾ in. and a lift of 11/32-in. They are operated by tappets of the mushroom type of molybdenum steel. Connecting rods have a center to center length of 9⅝ in. Heads for dual ignition can be furnished if desired.

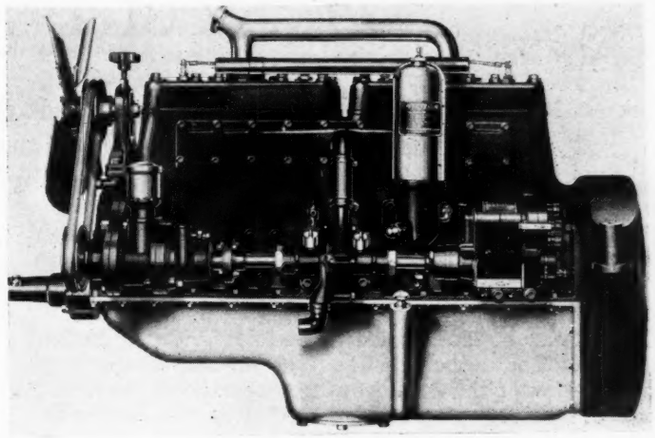
The camshaft is on the right side and is supported in four bearings of 2⅛ in. diameter. The front and rear bearings are 1⅞ in. long, the two center bearings 1¼ in. each. The diameter of the shaft between cams is 1 11/32 in. Timing gear drive is by helical gears with face width of 1½ in.

Lubrication by Gear Pump

Forced feed lubrication is by a gear pump which discharges through the main discharge line into a special built-in filtrator, from which the oil returns through the main return line with branches to the various bearings. The oil pump is located beneath the center main bearing and is driven from the crankshaft by helical gears through an inclined shaft. Case hardened shafts and hardened steel gears in the oil pump make for long life of this unit. The fan is driven by a 1-in. V-belt from the accessory shaft on the left side of the engine, which turns at 1½ times crankshaft speed. The breather is placed above the shaft in the rear of the timing gearcase flange.

Ignition is by battery and distributor, by magneto, or by both, as desired. Provision is made for mounting a distributor above the accessory shaft and for a drive to it from this shaft through helical gears and a shaft inclined at 24 deg. The magneto, if used, is driven from the end of the shaft through a coupling. The S. A. E. standard magneto mounting is provided.

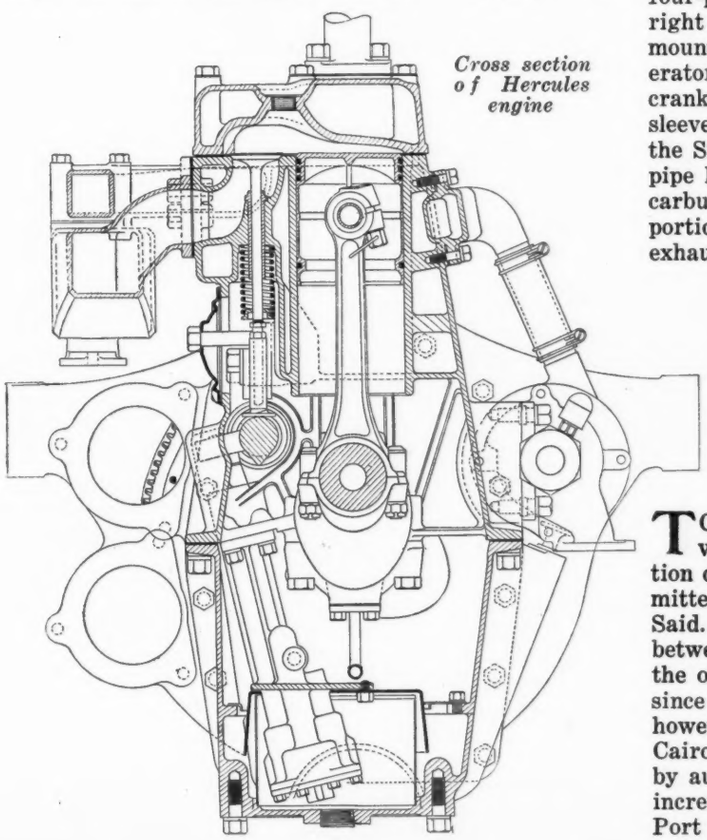
The water pump is located at the center of the cylinder block and discharges into a header extending almost the entire length of the block. A coupling forward of the pump makes it possible to remove this unit without disturbing the accessory shaft drive. Provision is made for mounting an air compressor with a capacity of from 3 to 6 cu. ft. per minute. The air compressor drive, however, is not a part of the standard engine. The air compressor is driven by a separate gear meshing with the train of timing gears. The gear and its bearings are built into timing gear cover.



Off side of Hercules engine

Either a No. 2 or a No. 3 S. A. E. flywheel housing is supplied. The ring gear on the flywheel is of steel and pressed on. The flywheel housing is bolted to the crankcase. Provision can be made for either three-point or four-point support. The 6-in. starter is placed on the right side of the engine and has a No. 2 S. A. E. flange mounting and a 13-tooth, 8-10 pitch pinion. The generator, which is on the right side, is driven at 1½ times crankshaft speed by gear. Either a base mounting or sleeve mounting is supplied. The intake manifold is of the Swan type. On the two smaller engines the intake pipe has a 1½-in. S. A. E. flange for a vertical outlet carburetor; on the largest engine, 1¾ in. The vertical portion of the intake manifold is surrounded with an exhaust jacket.

The same standardization of design has been carried out in this series of six-cylinder engines as in the line of nine four-cylinder engines manufactured by the company. Bolts of only one size, ½-in., are used for the oil pan, timing gear cover, bell housing and cylinder heads, starter mounting and many other places.



Cross section of Hercules engine

TO what extent the sale of automobiles in undeveloped countries is dependent upon the construction of roads is strikingly illustrated by a report transmitted to his government by the French consul at Port Said. Up to a few months ago the only means of travel between Port Said and Lower Egypt was the railroad, the old road leading along the Suez Canal having long since been rendered impassable by sand drifts. Recently, however, this road was put in condition again, and Cairo and Ismaili can now be reached from Port Said by automobile. The result has been an almost tenfold increase in the number of automobiles registered in Port Said in the space of a few months.

Drawing Methods Important *in* Tests *of* Steel Body Sheets

Local stresses much greater if drawing is done by means of punch and die than where load is produced hydraulically. Subject is discussed in paper by engineers of Budd Mfg. Co.

TESTS for automobile body sheet steel were discussed in a paper presented recently to the American Society for Steel Treating by J. Winlock and G. L. Kelley of the Edward G. Budd Mfg. Co. of Philadelphia. The authors pointed out that in considering the relation of the deep-drawing properties to the ordinary mechanical properties of steel it must be borne in mind that the details of the drawing process are of great importance.

For instance, local stresses are much greater if the drawing is done by means of the usual punch and die than where the load is produced hydraulically. The pressure exerted on the sheet by the blank-holder is dependent on the depth and shape of the draw and inversely proportional to the gage of the material. This makes it apparent that the deep drawing properties of a sheet must be correlated with its physical properties in an empirical manner, for each particular stamping.

It was found that the relation between the behavior of the steel in the die and its physical properties is subject to great variations. Samples for testing were taken only when the die was on the press and working regularly, that is, when either all or none of the stampings were breaking, and the behavior of the sheet in the die was in each case recorded.

For the tensile test, a specimen 0.750 in. wide with an 8-in. gage length, divided into eight 1-in. gage lengths, was used. The percentage elongation in 8-in. was noted as well as the elongation in the 2-in. gage length which included the fracture. It is realized, of course, that the value for elongation in the 2-in. gage length obtained in this way is a little higher than if a specimen containing only a 2-in. gage length had been used. It is believed, however, that for purposes of comparison, the method used is substantially correct. If the fracture occurred at the center of one of the 1-in. gage sections, an average was taken. The thickness of the test piece varied with the thickness of the sheets, which in these tests ranged from 0.030 to 0.60 in.

Variation in Thickness

A variation in thickness, other factors being held constant, will affect the percentage elongation, but in these tests this difference is believed to be well within the limits of experimental error. In the majority of cases six test specimens were taken from each sheet; three parallel to the direction of rolling and three transverse thereto. The average value of the test results from the former was plotted as an ordinate, and of the latter as an abscissa. The yield point and the tensile strength were obtained in the usual way. On account of the thinness of the sheets no attempt was made to obtain the reduction of area, although this figure would have been of great interest.

It was found that the most difficult stampings were made successfully when the minimum elongation in the 8-in. gage length of test pieces taken parallel to the direction of rolling was 25.0 per cent, and when, at the same time, the elongation in test pieces taken transverse to the direction of rolling was 25.0 per cent.

In order to test the validity of these figures, a rough classification of the relative difficulty of the different stampings was made. It was found that those stampings which were formed successfully from steels having lower percentage elongations than those just mentioned, were those with which comparatively little difficulty is encountered.

No Direct Relationship

There does not appear to be a direct and constant relationship between the percentage elongation in 2-in. and 8-in. gage lengths. In other words, the present methods of manufacture do not yield a product uniform enough to show in different sheets in the same lot physical characteristics which are exactly alike. Fig. 1 was obtained by measuring the percentage elongation in different gage lengths on test specimens from different lots which broke at the center.

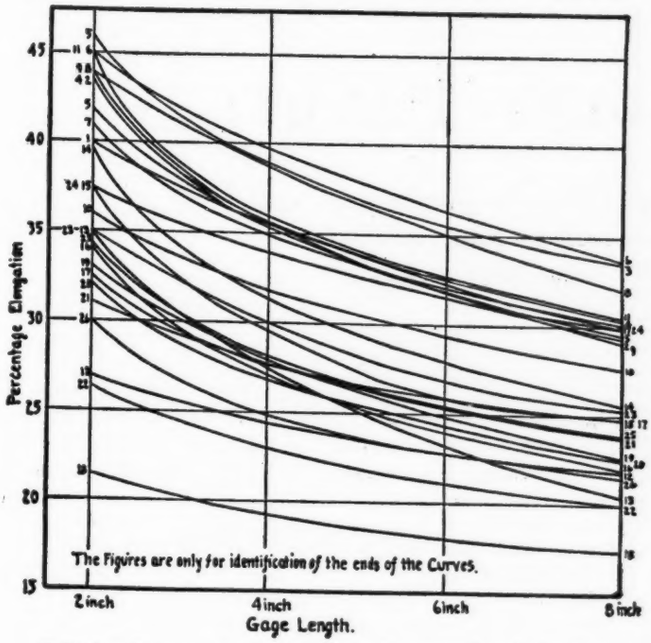
From this there would appear to be an advantage in using one gage length as compared to the other. However, the total number of steel which fulfilled one or both of the minimum qualifications for the 2-in. and 8-in. gage lengths, 83.0 per cent met the former and 82.6 per cent met the latter. If, then, either gage length were used as an acceptance test to the exclusion of the other, approximately 17.0 per cent of the material tested would be discarded as unsatisfactory when actually this 17.0 per cent would have passed the minimum qualifying elongations in the other gage length. It would seem somewhat preferable, therefore, to use a specimen containing an 8-in. gage length and noting elongations in both gage lengths. In this way, those steels which passed either the 2-in. or 8-in. qualifications would be accepted and the error in rejections would be entirely removed. In some instances the design of a stamping may be such as to require that the metal be capable of considerable general stretching and again it may require a high degree of local elongation. It is probably such differences as these which cause material having a high elongation in 2-in. to work satisfactorily even though the elongation in 8-in. is somewhat below the usual standard.

The average tensile properties of the steels which met the 2-in. gage length minimum elongations are:

Longitudinal				Transverse			
Elongation				Elongation			
2 in.	8 in.	Yield Point	Ultimate Strength	2 in.	8 in.	Yield Point	Ultimate Strength
36.2	27.4	24700	39900	35.4	26.5	28800	45000

The average tensile properties of the steels which met the minimum elongations for both gage lengths are:

Longitudinal				Transverse			
Elongation				Elongation			
2 in.	8 in.	Yield Point	Ultimate Strength	2 in.	8 in.	Yield Point	Ultimate Strength
39.8	29.2	24000	40300	38.3	27.8	27800	45200



Relation between gage length and proportional elongation

It should be noted that the yield point and ultimate strength are lower and the percentage elongation is higher in test pieces taken parallel to the direction of rolling than in those taken transverse to the direction of rolling. This is generally the case in tensile tests of sheet steel.

It was observed also that individual sheets taken from a lot which yielded a high percentage of breakage might show good test results. One or two tests will not give, therefore, the reason for failure of a lot unless one or both of the tests fall below the minimum elongations. In short, there must be uniformity within a somewhat narrow range throughout the same lot in order that tests be conclusive.

As has been pointed out, the properties will sometimes vary in different parts of the same sheet. This may be caused by annealing at too low a temperature, by heating too short a time at the proper temperature, or by other factors. This is shown in the following results which show the tensile properties before and after annealing at 1150 deg. Fahr.

The results of the tensile tests before annealing in the laboratory were:

	Longitudinal				Transverse			
Properties	Elongation		Yield	Ultimate	Elongation		Yield	Ultimate
At Position	2 in.	8 in.	Point	Strength	2 in.	8 in.	Point	Strength
A	31.5	15.8	32,900	41,500	24.0	16.1	34,500	41,500
B	35.0	25.0	30,900	41,900	32.0	18.7	34,500	48,900
C	28.0	20.5	34,300	49,000	31.0	20.9	32,100	48,500

The results of the tensile tests after annealing at 1150 deg. Fahr. in the laboratory were:

	Longitudinal				Transverse			
Properties	Elongation		Yield	Ultimate	Elongation		Yield	Ultimate
At Position	2 in.	8 in.	Point	Strength	2 in.	8 in.	Point	Strength
A	36.0	29.1	22,400	39,500	30.8	22.9	24,100	46,400
B	35.5	29.0	21,800	39,700	39.5	25.1	27,100	47,400
C	36.0	30.9	29,700	45,600	39.0	30.3	27,500	47,500

There appears to be no definite relation between the yield point and the deep drawing properties. If the yield points parallel to and transverse to the direction of rolling are less than approximately 30,000 and 34,000 respectively, the chances that the steel will give satisfactory results appear to be about equal. Extending this observation, the ductility from a drawing standpoint cannot be accurately judged by a bend test or by bending the sheet by hand. If a sheet bends upon application of a small force, the chances appear to be about equal that it will form satisfactorily, and a much smaller chance exists if it appears to be stiff.

Ultimate strengths also were found to have no exact relation to the deep drawing properties. If the ultimate strengths parallel to the direction of rolling and transverse to the direction of rolling are less than approximately 46,000 and 49,000 lb. p. sq. in., then the chances of the steel being satisfactory appear to be about equal.

The difference in intensity of stress between the ultimate strength and the yield point does not give any indication of the deep drawing properties. The ratio of yield point to tensile strength is considered by many to be of value in determining the ductility of sheet steel. The authors found good drawing qualities in materials in which this ratio differed widely. In general, the more nearly the yield point value approaches 50 per cent or less of the tensile strength the less is the tendency to form buckles which are difficult to draw out, but, on the other hand, excellent stampings of difficult design can be made when the yield point is more than 65 per cent of the tensile strength. It thus appears that the yield point tensile ratio is not very helpful.

Cup Value and Ductility

It was also found that no exact relation exists between results obtained on an Olsen cup testing machine and the percentage elongation obtained in 2-in. and 8-in. gage legths. Some to the plots made in the cup test values were corrected according to Erichsen's curve which shows the change in depth of cup with change in thickness of sheet. A very low cup value is usually obtained in a sheet very low in ductility, and a very high cup value usually is obtained from a sheet high in ductility, but any value obtained between these two extremes does not give a reliable measure of the deep drawing properties.

There does not appear to be any exact relation between the microstructure and the deep drawing properties. The reductions accompanying cold rolling are usually so small that evidences of this cannot be detected in the shape of the grains and yet one pass through the cold rolls may lower the percentage elongation by 5.0 per cent or more.

The strain produced by cold rolling sheets is not usually in itself enough to result in exaggerated grain growth, but when this is coupled with the incomplete removal of cold rolling strains produced at the hot mill, it may be a troublesome factor. Large grain size is not necessarily harmful to the deep drawing properties, but is undesirable for two reasons:

1. A coarse granular surface is produced on the stamping where the draw is deep.

2. It favors the occurrence of Stead's rectangular brittleness. This phenomenon, due to a preferred orientation sometimes produced by cold rolling and subsequent annealing, does not exhibit brittleness, however, unless the stress is applied at certain angles to the cleavage planes. Thus, a sheet may draw perfectly in a preliminary operation and then exhibit extreme brittleness in a subsequent operation in which the application of the stress has been from a slightly different direction.

The condition of the cementite seems to bear no relation to the ductility of the sheet.

Can We Apply *the* "Simultation" Idea *to* Human Effort?

Plan is suggested whereby more scientific grading of workers according to skill and speed might result in selection of men of same grade for mass assembly jobs.

By John Younger

A FEW years ago the late Frank B. Gilbreth brought to my attention a little book—Elderton's Primer of Statistics—published by Adams and Charles Black of London. He told me that although the size of this book was small its contents would be found to have a large bearing on some industrial problems.

I read the book at the time and came across some thoughts which have a distinct bearing on automotive production problems. One of these thoughts is presented here.

In this book the Eldertons study the variations of individuals of a species from the medium or norm for the characteristic being studied. They discovered that nearly all characteristics of the individuals varied in approximately the same manner and that a frequency curve expressing these variations assumed about the same shape for all characteristics. A frequency curve, of course, is simply a curve whose abscissae are various degrees to which a particular characteristic may be present in various individuals and the ordinates are the number of individuals so affected.

For example, the leaves of a tree are not all the same size. Some few are considerably smaller than the average, an approximately equal number are considerably larger, while the vast majority vary only slightly from the average or mean size. Expressing this condition in the form of a frequency curve gives something like Fig. 1, in which it is evident that the greatest number of leaves are of a size closely approximating the average size and that as the size increases or decreases from this average the number of leaves steadily diminishes until the two extremes are reached.

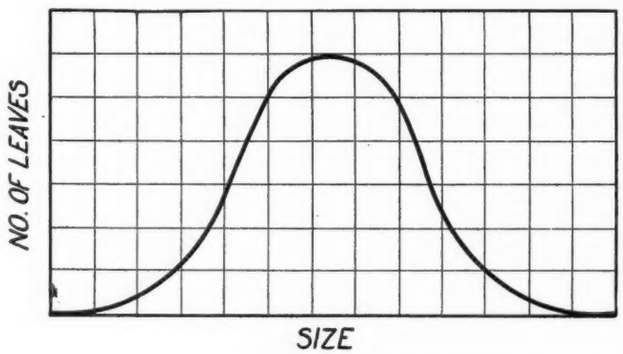


Fig. 1

The Eldertons worked out similar curves for all sorts of things such as variations in oyster shells, nuts, heights of men at specific ages, and so on, and in all these studies the form of the frequency curve developed was found to be similar to that shown in Fig. 1. It seems logical, therefore, to believe that if a curve were plotted for the various times taken by a group of men for performing a standardized task it would follow the same general path as the other curves.

In other words, we would expect that a few men would perform the task very rapidly, a few more would take a much longer time to do it, while the majority would accomplish it in times varying but slightly from the average time, which would be about midway between the highest and lowest times.

If this supposition is true, consider now the idea that we might utilize this statistical method for properly fitting workers to their jobs. Suppose that we divide the varying grades of skill required on different operations and design standard tests for each grade.

For lathe operations, for example, we might have six grades. The first standard test might be of the simplest, least skilled order—possibly turning a rod parallel. The second test would require slightly more skill and might consist of a simple screw-cutting operation. The third, a little harder, might call for internal and external chucking work. So the tests would be developed until the sixth test would require a very high degree of skill, such as a job of eccentric turning and boring to very close limits.

Then we would establish frequency curves like Fig. 2 for each one of these standard tests by experiment among our own workers, amplified, if possible, by similar experiments in other plants where the same sort of work is being performed. A very considerable number of our most skilled workers would be given test No. 6 and a frequency curve for their composite performances plotted. Likewise, frequency curves would be made for the other tests from the actual performances of workers whose latent capacities best fit them for the type of work being tested.

Obviously, it would be a rather difficult problem to obtain performance data in this way since, in effect, each worker would have to be tentatively graded before he

could be assigned to the proper test to be employed in determining his grade. Practically, this difficulty might be worked out through knowledge of what the man has done and can do as expressed in his previous performances.

The important thing is, of course, that in establishing a frequency curve for a Class 3 man, for example, only the performances of workers graded as Class 3 men should be used. If the time taken by a Class 1 man to perform the Class 3 test were taken as a criterion of the time a Class 3 man should do it, the whole test will be useless.

With these tests standardized we could utilize them for appraising the working abilities of workers instead of relying wholly upon their ability to sell themselves by conversation. When a man applies for a turner's job he would be given test No. 1. If the time the applicant requires to complete the test falls in the right hand section of the previously established frequency curve he is proved to be too slow, according to the existing standards of work in that particular plant, at least.

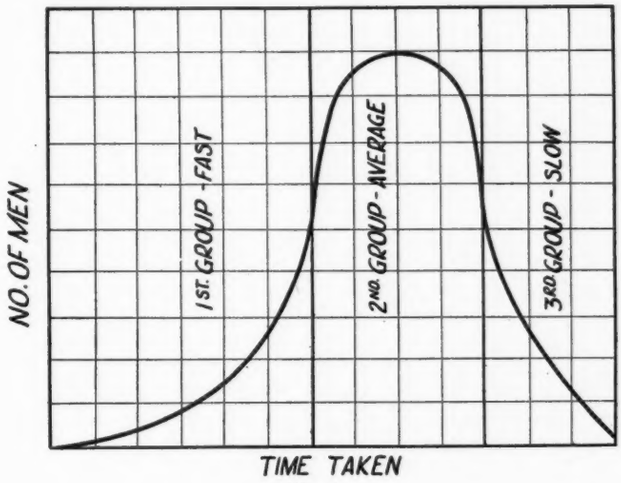


Fig. 2

If his time falls in the center section of the curve his abilities are seen to be that of an average mechanic of a low grade of skill and he can be hired for work of that kind. If, on the other hand, his time falls into the fastest group he probably is too good to be kept on such simple work and should be transferred to more difficult tests.

He is run through the tests until he is placed in his proper zone or in that class of work in which the time required by him to complete the job is approximately the same as the average time taken by a large number of workmen previously allocated to this type of work. He is then selected for the work he is best fitted for; the company gets the best work out of him and also profits by the fact that labor turnover will be reduced by such proper selection.

This theory can be somewhat simply worked out when it is applied to individual production units. Let us apply it to mass assembly work in which conveyors are employed and let us adapt the idea of Simultation to human effort in the same way that E. P. Blanchard of Bullard Machine Tool Co. has so well applied it to machine operations.

Simultation may be defined as the process of shortening the total time required to perform any job by multiplying the number of tools or working units which can be operated on the job simultaneously. Perfect Simultation is obtained when each of the several tools or other working units performs its allotted task in exactly the same time as all the other tools or working units which are operating simultaneously with it.

For example, a cylindrical bar requires a certain amount of time to be machined when using a single cutting tool. If three cutting tools, equally spaced along the bar, were used with the same speeds and feeds, the total cutting time would be one-third of the former time and the Simultation factor would be three.

It will be granted that in line assembly the speed of the group is regulated by the speed of the slowest man. Perhaps the straw boss can pick out the slowest man but more often he cannot, as it is very hard to do so. We find, usually, that men of all degrees of latent speed are at work on a line. This is at complete variance with the law of Simultation which would dictate that each man should have a capacity equal to that of his neighbor to insure an equal amount of work being done by each member of the group at an equal rate of work output.

We can get a close approximation of Simultation if we establish a series of tests to indicate dexterity in assembling. By establishing frequency curves from these tests we can accurately locate a man in his proper zone of skill. Then, by assembling groups from men in the same zones of skill, a certain degree of Simultation will be obtained.

Of course, in the practical operation of such a plan it would be almost impossible to arrive at absolute Simultation. Varying degrees of fatigue will be found in the several workers of a group, their general health trends will affect their output and some workers will increase in skill and productivity through experience faster than others, so that, unless periodic tests are given to determine the net effect of these changing conditions, considerable variation in the relative working abilities of the group members may result. But in general, some such plan as this would probably produce better results in the way of Simultation than the more or less haphazard methods commonly employed for the placement of workers.

Another practical question arises in considering how such a plan could be introduced most successfully. In effect, it is somewhat analogous to the work of specifying and testing of steel which was first started in a small way by the S.A.E. and is now accepted by nearly the entire industrial world. Similarly, the application of the Simultation principle to placement of workers might be started in a small way by a single concern but obviously it would better be accomplished through the cooperative action of a group of concerns, an industry or several industries.

Central Bureau of Records

To introduce the plan, machine tool-using industries might set up a series of tests through conferences. Then all applicants for work in these industries would be given these tests and the results sent to a central bureau. By comparing each individual's record with the frequency curve for the work he expects to do the degree of skill he possesses in relation to the general standards of the industry would be definitely measured.

When a sufficient number of applicants had been tested under these conditions so that the reliability of the curves and of the original standard tests has been proved, the curves would be distributed throughout the industry just as are steel specifications and all applicants for work would be tested against them. By

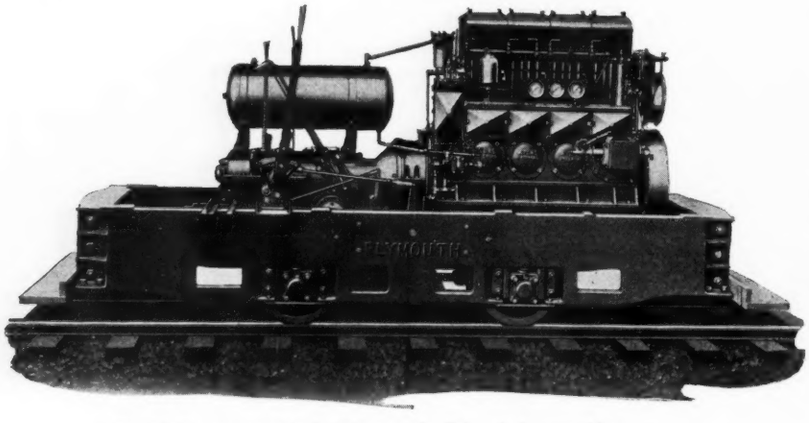
such means the placement of a man can be made scientific, in a sense, and the resulting decrease in labor turnover—since it is a well-known fact that a man doing work for which he is particularly fitted is a man who is apt to stay on the job—will be a most important economic benefit to be derived, and one which will be appreciated by all production men.

Other results would be in the way of increased output for a group of men, whether at machine work or on assembly because, of course, increased output is the result of Simultation. Other beneficial results can readily be imagined of a plan which would, throughout the industry, place every worker in just that type of work for which he is best fitted and which would make the individuals of any group of workers completely complementary to one another in most efficiently carrying on the group task.

Naturally, all the above is, so far at least, a rather interesting speculation. If it could be worked out the expected results are promising enough to warrant a bit of thought on the part of production men interested in the general economics of their job. A thorough discussion of the subject might easily lead to something of real value to the industry.

Plymouth Gear-Driven Diesel Locomotives

WHAT is believed to be the first Diesel-powered, gear-driven locomotive built in America has just been brought out by the Plymouth Locomotive Works (The Fate-Root-Heath Co.), Plymouth, Ohio. The big saving in fuel cost effected with the Diesel engine is, of course, the main reason for adopting this form of power. The cost of fuel oil varies from 3 cents per gallon on the Pacific Coast to 6 or 7 cents in the Midwestern States. The engine consumes from 2½ to 3½ gal. per hour, depending on the class of service, and the consumption of lubricating oil is said to be somewhat less than in a gasoline engine of equal power.



Partially assembled Plymouth Diesel locomotive

The powerplant is a four-cylinder, four-cycle, inclosed type Atlas-Imperial Diesel engine with 6½ by 8½ in. cylinders, developing 77 hp. at a speed of 650 r.p.m. The fuel system is a constant pressure system. Lubrication is by force feed. A gear-driven pump maintains a constant pressure of lubricating oil on the main bearings, while drilled crankshaft and connecting rods conduct the oil to the crankpins and piston pins. Fresh oil to the cylinder walls is supplied by Madison-Kipp sight-feed lubricators.

A chain-driven centrifugal pump is used to circulate the cooling water. Starting is accomplished by compressed air, and a small combined gas engine and compressor is fitted in the cab for providing starting air. This unit is used for emergency only. The engine has built into it an air compressor that normally supplies all the air necessary for keeping the starting tanks filled.

The transmission follows the standard practice of the Plymouth Locomotive Works, consisting of a heavy cast-iron split housing fitted with sliding change gears that give four speeds forward and four reverse. Heat-treated gears and shafts carried on ball or roller bearings are used throughout. A "Twindisk" clutch is mounted on the engine crankshaft. A standard S.A.E. bell housing incloses the clutch mechanism and forms a means of connecting the engine and transmission. The final drive from transmission to driving axles is by means of two short hardened steel roller chains.

A heavy cast-steel frame forms the structure upon which the engine, transmission, cab, etc., are mounted. The side frame members also form the truck frame, having suitable provision for mounting the roller bearing axle boxes. Heavy cast-steel bumpers on each end complete the frame structure.

A Modine sectional radiator and a 30-in., eight-bladed fan driven from the engine provide the necessary cooling. Braking is accomplished by means of hand levers, although provision is made for the application of air brakes when required.

The weight of the locomotive ready for the rails is 20,000 lb. and the entire weight comes on the wheels, all of which are drivers. This gives a draw bar pull of 5000 lb. on dry rails at 2½ m.p.h. Additional speeds of 4, 8¼ and 13½ m.p.h. are provided.

The first three of these 10-ton Diesel locomotives were shipped to the Kaiser Paving Co., Oakland, Cal. Their cars weigh 12,000 lb. each, empty, and each car holds 12 yards of gravel weighing 36,000 lb. making each car with load weigh 48,000 lb. One Diesel 10-ton locomotive handles six of these loaded cars, total load 144 tons, up a 3 per cent grade at a speed of 8.1 m.p.h.

Plymouth Diesel locomotives will be made in a full range of sizes from 10 tons up to 50 tons, and the larger sizes will soon be in production.

THE German Automobile Manufacturers Association has issued a statement giving its views regarding the proper basis for motorcar taxation. It recommends that the tax on private passenger cars and motorcycles be based on the piston displacement as a measuring unit, in arithmetical progression. The various other possible bases of taxation are discussed from the point of view of conditions in Germany and abroad and the conclusion is reached that they are less suitable under present German conditions than the method recommended.

Just Among Ourselves

How the Consumer's Dollar is Divided

WITH the automobile industry finding it more and more necessary to pull together in its cooperative effort to get a greater share of the consumer's dollar, some figures recently developed by the domestic distribution department of the U. S. Chamber of Commerce are interesting. Recent surveys made by this organization show that in Syracuse nearly 17 cents of the retail dollar is spent for automobiles, gasoline and accessories, while in Baltimore the proportion going to automotive retailers is only 9 cents and in Denver 16 cents. Facts of this kind will be of very great value to the automotive industry provided they are taken as a basis for further investigation on the part of our industry to determine the reasons for the sort of variations indicated. When such reasons are developed and analyzed they may well form the basis for more effective automotive merchandising under the conditions of the new competition.

* * *

Everything Synthetic but the Eyesight

TALKING about the way whole industries are competing these days and the possibilities of substitution of one article for another, Charles F. Abbott, executive director, American Institute of Steel Construction, visualized conditions quite vividly in a recent talk which we heard him make in Chicago. Having enjoyed his summary very much personally, we are passing it along: "We are living in a synthetic age," Mr. Abbott said. "Observe almost any young woman of the present generation as she sits opposite you in the subway. Sandals of synthetic snake skin, synthetic silk stockings, dress and underwear. Synthetic complexion, synthetic coloring of her hair, synthetic hat, synthetic perfume and possibly a synthetic breath and brain. Certainly this illustrates the infinite possibilities inherent in the substitution of one article for another." We agree with Mr. Abbott that it does—and that it also illustrates how keen some people's eyesight is.

* * *

Last Quarter Output is Falling Behind

AS the days pass and the fourth quarter wanes, it becomes apparent that Ford is not going to get into production in sufficient quantity before the first of the year to affect vitally output totals for this period. Consequently, those prophets who predicted a larger output in October, November and December of this year than in the same months of 1926 probably are going to find themselves slightly, although not grievously, mistaken. Since we were among this group, we feel that the alibi given is thoroughly sound. October production figures for N.A.C.C. companies alone, however, show some 8 per cent decline as compared with last October, and with the Ford situation still retarding business to a marked degree the chances of equaling the last quarter of 1926 now seem to be slight.

* * *

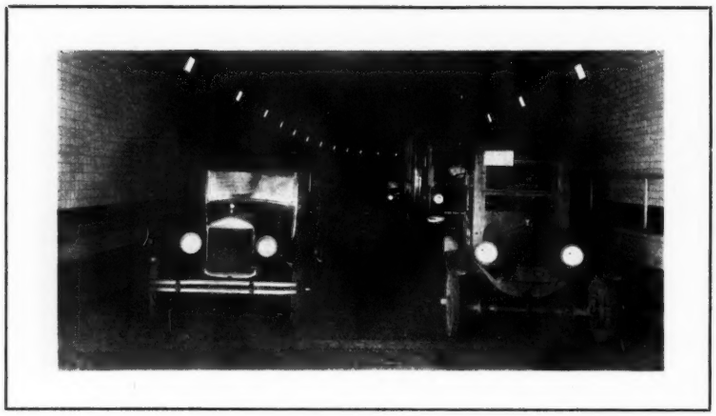
Long, Uphill Tax Fight in Prospect

JUST when automotive men were beginning to get a bit confident that their constructive educational work of the last few years finally had convinced Government officials of the injustice and unsoundness of motor vehicle excise taxes, Secretary Mellon comes along with a flat declaration of his belief that such taxes should be incorporated as a permanent item in the peace time revenues of the Government. Mr. Mellon's statement puts the whole issue right back where it was several years ago; the old argument must be unearthed about whether or not the motor car is primarily a utilitarian vehicle. The battle cannot now be conducted merely with the idea of getting these nuisance taxes removed as soon as possible. The Secretary of the Treasury's attitude indicates that the fight must be as to whether they ever are to come off or not.

* * *

National Protest Being Advocated

LAST Monday representatives of several important automotive organizations, including those of the N.A.C.C., the A.A.A., the M.A.M.A. and the N.A.D.A., as well as of the American Farm Bureau Federation, went to Washington and presented to the Ways and Means Committee the vital reasons for repeal of these war taxes. Again the industry is promising to pass on to the public any benefit which may be received from such tax reductions. We are glad to add our voice to those which are urging repeal and to repeat the statement contained in a recent bulletin from the N.A.C.C. taxation committee which reads: "It is the judgment of your committee that as a result of the Mellon statement these taxes will be continued (and possibly increased whenever additional funds are needed) unless there is a national protest made at once to members of the Ways and Means Committee and to all other members of Congress for their elimination."—N. G. S.



Opening of *Holland Tunnel* a Boon *to* Automotive Interests

Great vehicular passage under Hudson River expected to stimulate motor travel in New York District. Special emergency trucks designed.

By John C. Gourlie

THE opening of the Holland Tunnel, Nov. 12, connecting by an under-river roadway New York and Jersey City, is of more than local importance to the automotive trade and industry. It establishes a precedent of vast importance in the handling of vehicular traffic and will be proof that under-water projects of the kind are practicable and not too costly in view of the advantages attained. The total cost is about $49,500,000.

A similar tunnel, more than a mile in length, has been in use in Pittsburgh, Pa., for several years. There, however, the tubes are laid under a deep hill instead of under water.

The Holland Tunnel is in two sections, each with a roadway 20 ft. wide to accommodate traffic in one direction. Two streams will run each way and trucks and pleasure cars will be separated. What this means is that from the heart of lower New York to Jersey City, and from there to all points in the New Jersey suburban district and to the main highways south and west, a steady stream of about 1900 vehicles an hour can proceed at about 25 m.p.h. An equal capacity on the return trip will give a peak hourly movement under the Hudson River of 3800 cars and trucks.

This contrasts with the slow movement and limited capacities of the ferries and undoubtedly opens the way to an enormous development of motor use, both pleasure and commercial.

The waits at the ferries at busy times have removed all pleasure in motoring between New York and New Jersey and effectually hampered the development of commercial trucking and bus services. The trade in New York and New Jersey—particularly the latter—should feel an immediate stimulus. For persons working in New York residence in New Jersey will have a new attraction that should boom the suburban residential districts.

Experience has plentifully shown that when outlet by motor from congested districts is made easier, sales resistance is broken down. More and more the automotive trade and industry are realizing that traffic congestion is probably the greatest adverse influence on buying. When the Philadelphia-Camden suspension bridge over the Delaware River was planned a movement of 6,000,000 vehicles the first year was forecast. Such was the boom brought about by the opening of the bridge, however, that the actual movement the first year was 7,800,000. The engineers of the Holland Tunnel have not endeavored to estimate the yearly use of the under-river highway, but its capacity is about 15,000,000 vehicles for 12 months.

The problem of keeping the air in the tubes clear was of course a difficult part of the planning of the tunnel. The engineers started with the initial knowledge that carbon monoxide in the tunnels would have to be limited to four parts in 10,000 if unpleasant or actually serious effects upon the drivers and passengers, not to mention the traffic force, were to be avoided. To accomplish this by the relatively simple means of blowing fresh air in one end and out the other would cause a gale of 70 to 80 m.p.h. to rage through the tubes.

Air Ducts Are Provided

The plan ultimately chosen was to have air ducts above and below the roadways. From four ventilating buildings fresh air is blown in underneath and passes upward through openings. The vitiated air is drawn into the upper duct and carried out that way. Thus the only movement of air, so far as passengers will experience it, is upward. There is no longitudinal movement.

Batteries of fans, with several always in reserve, will change the air 42 times an hour, forcing 3,761,000 cu. ft. of fresh air per minute into the tubes. There will be green and red traffic signals, and an additional "stop engines" sign. The need for using the latter, however, is remote, with surplus ventilators and arrangements

for using power from alternate sources in cases of powerhouse breakdowns.

The total length of the tunnel is 9250 ft., of which 5460 is under the river, in mud and rock. The maximum upgrade is 3.8 per cent and the maximum downgrade 4.06 per cent. The entrances and exits on each side of the river are some distance apart, so as to render more easy the handling of traffic at terminals.

The toll rates recently made public by the joint tunnel commissions of New York and New Jersey are as follows:

Motorcycles	$0.25
Passenger automobiles	.50
Trucks (up to 2 tons)	.50
Trucks (2 to 5 tons)	.75
Trucks (5 to 10 tons)	1.00
Trucks (10 to 12 tons)	2.00
29-passenger buses	1.00

Truck weights are gross weights. Trailers are charged as separate vehicles.

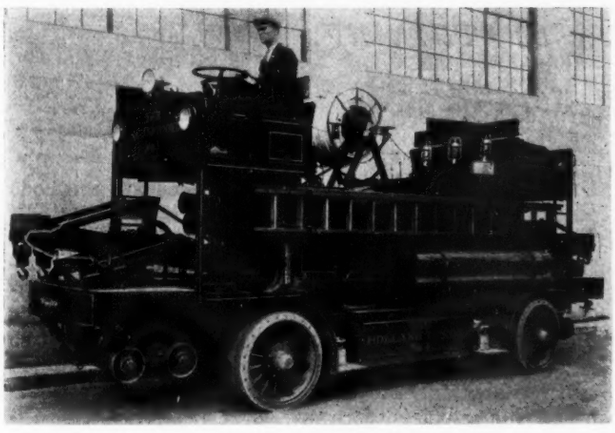
With the decision by the engineers of the joint tunnel commissions of New York and New Jersey to use storage batteries for the motive power of their emergency trucks, special vehicles were designed by the Commercial Truck Co. of Philadelphia to meet all possible accident contingencies that might arise in the operation of the tunnel.

Steer From Either End

The problem was how to remove a broken-down vehicle in one lane without interfering with traffic in the other lane. This was solved by designing vehicles that would steer from either end, thereby permitting the emergency vehicle to drive in to a wreck, couple on to the same and, by reversing the movement, draw the wreck out. One emergency truck is stationed at each end of the tunnel.

Each emergency truck carries a driver and crew of seven men, each seat accommodating four persons. Equipment to cope with any possible situation is provided and includes the following items:

Headlights and tail-lights; permanent searchlights and rear vision mirror at each end; fire bell; five-ton

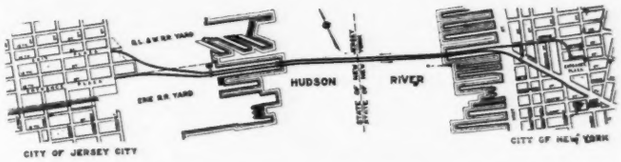


One of the special emergency trucks designed for the Holland Tunnel by the Commercial Truck Co. of Philadelphia

wrecking cranes at each end; screw jacks; towing dollies of 6 and 9 tons capacity; tool box with Stillson wrenches, hammers, pinch bars, towing rope, chain blocks, hack saws, etc.; ladders, plain and extension; portable fire extinguishers and a foam type chemical fire apparatus of 200-gal. capacity operated by a pump taking its current from the motive power battery; hose mounted on reel, pike poles and fire axes.

As additional emergency apparatus, each truck is equipped with four gas masks, four portable searchlights, first aid cabinet, four stretcher outfits with blankets, splints, bandages, etc., rubber coats, hats and boots, patrol covers and a portable inhalator of mine type.

Before being accepted by the tunnel commissions these



Map showing entrances and exits of Holland Tunnel in New York City and Jersey City

trucks were given a very rigid series of tests which included drawing from the tunnel up a 4 per cent grade a loaded vehicle weighing 15 tons on the towing dollies.

Tires Sold in England Must Show Country of Origin

THE Standing Committee under the British Merchandise Marks Act recently issued its recommendations concerning tires and air tubes for automobiles and cycles. It is recommended that tires imported into England, pneumatic, solid and semi-solid, shall be required to bear the mark as to origin at the time of importation as well as when sold or exposed for sale, and that the mark must also appear on the wrapper or container in which they may be imported or placed on sale; further, that "exposure for sale" shall expressly include wholesale transactions as well as retail.

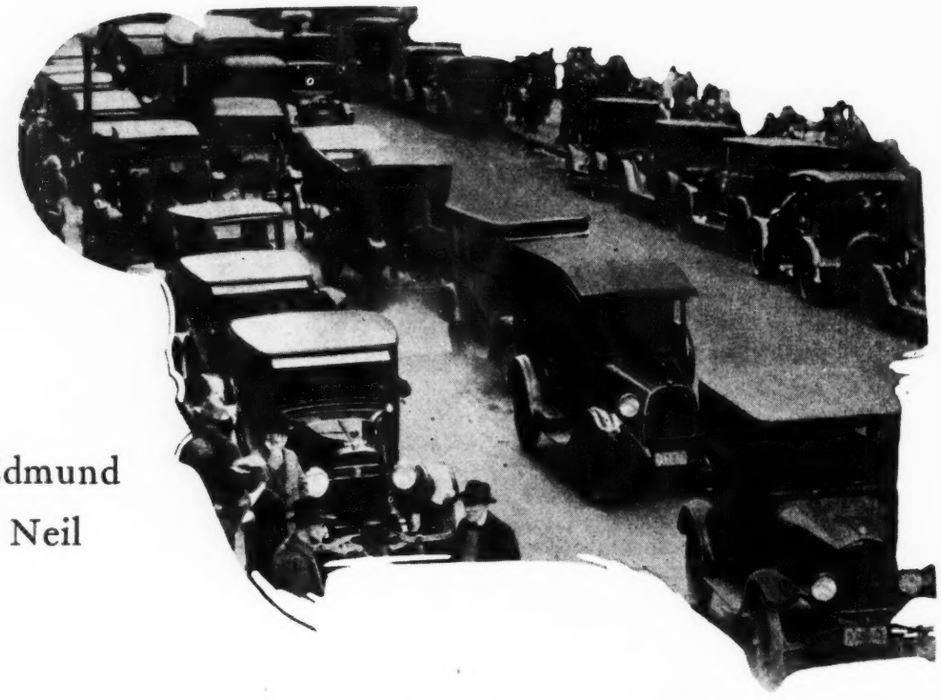
A large part of the inquiry preceding the issue of the recommendations, during which the views of both British manufacturers and importers were heard, was taken up by arguments for and against the effect of the announcement in advertisements as to the country of origin of imported tires; this would be compulsory if an Order-in-Council under the Act were made. British makers attached great importance to this provision, but importers argued, first, that a company with factories in several different countries advertises its tires and tubes irrespective of the particular factory in which any given tire or tube was made. How, it was asked, could such advertisements be framed so as to give an indication of the origin of each class of goods sold? The importers contended that to impose such an obligation would be tantamount to a prohibition of advertising.

On this point the Committee says it seems that all that would be required is that advertisements should include such a phrase as "Factories in the United States of America, France and Canada," or some formula giving the same indication.

With regard to tire covers and solid tires, the Committee thinks it necessary to insure that the indication of the country of origin shall be clear after the tire has been fitted, and it recommends therefore that the mark must be moulded in a conspicuous position on the wall of the cover or tire, "in such a manner as to be visible when the tire is assembled into the motor car or other vehicle."

What is the Market for Replacement Parts?

By Edmund B. Neil



Answer is found in analysis showing percentage of cars of varying ages still in service.

DURING the past few years a great deal of attention has been given to determining with as much accuracy as possible the size of the replacement market for motor vehicles. The volume of this business depends upon the average life of a motor car, and information on this subject is not readily available.

As early as 1923, P. M. Heldt in *Automotive Industries* published one of the first studies of motor car life in which the average useful life of an automobile was given as 6.73 years. This figure was based upon the best registration statistics then available, combined with data covering exports and imports and represented the average life of cars placed in service from the fall of 1911 to the fall of 1915. (See *Automotive Industries* for Aug. 23, 1923.)

Since that time, the more accurate registration of cars by the various states, together with better figures relative to vehicle production, have shown that the value of 6.73 years could be considered too low, and that cars actually "lived" longer than was previously supposed.

One of the most recent and most accurate methods of determining car life was developed by Prof. C. E. Griffin of the University of Michigan, in which the same methods followed by insurance actuarians in arriving at figures for the "life expectancy" of individuals were applied to the automobile. Prof. Griffin's results were based upon vehicles registered for two years in the State of Michigan, and were later applied to give values for the entire United States. The results of this analysis were presented in *Automotive Industries* for April 8, 1926.

Following the presentation of this study, in which the average life of a motor car was found to be 7.04 years, K. W. Stillman applied Prof. Griffin's data to an analysis of the possible replacement market and showed that this market might be expected to reach 2,900,000 cars by 1931. (See *Automotive Industries*, April 29, 1926.) In this article the previous errors were pointed out and table shown for the number of cars sold to replace those scrapped from 1908 to 1927.

In addition to the foregoing articles on this subject, the National Automobile Chamber of Commerce has for some years presented in its yearly issue of "Facts and Figures" a tabulation along similar lines showing the growth of the replacement market from year to year.

While all these data are exceedingly useful in determining the replacement market for new automobiles, they are not presented in such a way as to show the number of cars of varying ages still remaining in service at this time—the 19,000,000 passenger cars now said to be in service on the streets and highways in this country.

While the value of an analysis covering this angle of the subject may have been open to question in the past, it now seems obvious that there is some information of value to be secured from such a study. The market for replacement parts to fit various makes and ages of cars is one which has been and still is growing at a tremendous rate. Up to a short time ago it was considered that since it was known there were many cars of certain vintages still in use, a closer approximation of their numbers was not necessary. This condition seems to be changing.

With the increasing number of companies entering the replacement parts and accessory manufacturing fields, and the undoubted fact that competition will be more and more severe as time goes on, it would appear that to know how many passenger cars of varying ages were in use at any given time, and hence the potential market for given sizes or types of parts or accessories, might serve as an index of the amount of business to be secured from users of these vehicles. At the same time it is possible, when the quantity of any particular make of car produced in any one year is known, to determine with reasonable accuracy the number still remaining in use after a given period of time. Naturally this determination of car life by makes is open to considerable variation, particularly for the higher priced vehicles, yet these are not produced in very large numbers, and it is probable that even as these vehicles become older, the amount of service their owners would feel justified in giving them would not be very far away from the general average. The same variation is possible from the standpoint of the lower priced makes, and such factors as these, together with the fact that changes in the design of the new Ford car will shortly take place, should be kept in mind in applying the following figures.

The attached table gives the probable numbers of cars of varying ages in service by the end of 1927, assuming that around 3,000,000 cars will constitute the production of cars for domestic use this year. However, it should be noted that the number produced during the year does not affect the essential accuracy of the tabulation, since any correction would alter the values for the year only and, of course, the total to conform with any such change. A second point regarding this table is that the third and fourth columns can be used to determine new values for later years merely by shifting the fourth column up one line and remultiplying the numbers to obtain new values for the last column. For instance, next year (1928) the production (or domestic sales determined by adding imports and subtracting exports) for the year would be multiplied by 99.78 per cent instead of using this figure to multiply with the given value for 1927, and so on throughout each item down the two columns.

Passenger Cars of Varying Ages in Use in U. S.

Age Jan. 1 1928	Year Car Was Made	Domestic Production (Cars Only)	Per Cent Still in Use	Number Remaining in Use at beginning of 1928
0	1928		100.00%	
½	1927	3,000,000	99.78	2,993,400
1½	1926	3,527,000	97.73	3,446,940
2½	1925	3,452,000	93.33	3,221,750
3½	1924	2,995,000	86.58	2,593,070
4½	1923	3,448,000	77.66	2,677,720
5½	1922	2,253,000	66.99	1,609,295
6½	1921	1,427,000	55.31	789,275
7½	1920	1,657,000	43.31	717,650
8½	1919	1,592,000	31.93	508,325
9½	1918	874,000	21.96	181,190
10½	1917	1,677,000	13.95	233,930
11½	1916	1,471,000	8.05	118,415
12½	1915	795,000	4.18	33,230
13½	1914	516,000	1.92	9,910
14½	1913	438,000	0.76	3,330
15½	1912	356,000	0.255	910
16½	1911	199,000	0.071	140
17½	1910	181,000	0.016	30
18½	1909	129,000	0.002	3
19½	1908	64,000	0.000	0
		Total cars produced for domestic sale since 1908		Total cars in use at end of 1927
		30,051,000		19,138,513

In addition to using the table for computations covering later years, a third point of interest is that the value of 19,138,000 for the total number of cars in use by the end of 1927 does not correspond with ordinarily accepted values for total vehicles in service. Two elements affect this difference. One is that the usual total includes motor trucks, buses, etc., and the other, which is more important, is that it does not take into consideration the millions of cars retired from service during the year and which are not subtracted from total registrations until time for their re-registration in the year following. When correction for this condition is made, it will be found that the value for cars in service as given in the table checks quite closely with the revised figure. Prof. Griffin found that when the values obtained from his method were applied to registrations for the entire country, the error was less than 5 per cent, due largely to difficulty in securing reliable figures for the "net additions" (production plus imports minus exports) for an individual state (Michigan). However, this element is of relatively little importance in recent years since production has been much more important than elimination in determining changes in registrations from year to year.

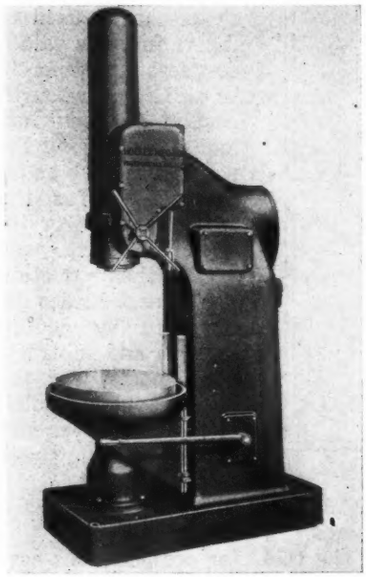
In view of these conditions it is logical to assume that the accompanying tabulation gives values as near the real figures as it is possible to obtain by other than a complete registration check, a process beyond the scope of ordinary analysis.

GERMAN papers report that the General Motors Corp., which is equipping an assembly plant for Chevrolet, Oldsmobile, Buick and Oakland cars at Berlin, is planning the production of a small displacement, low-tax rating car for the European markets.

New Developments— Automotive

Production Drilling Machine

HOEFER MFG. CO., INC., Freeport, Ill., has developed a new 5-7½ hp. production drilling machine to which appliances such as heads, fixtures, indexing tables, etc., can be applied to become an integral part of the machine. The machine has a capacity in the 7 hp. model for drilling 2½-in. holes in steel and tapping 3½-in. holes in cast iron; a swing of 24 in.; spindle travel of 12 in.



Hoefer 5-7½ hp. high production drilling machine

Some of the design features incorporated in the new drill are helical bevel drive gears; hardened mutiple splined spindle; anti-friction bearing equipment throughout; alloy steel gears, hardened and heat-treated; screw or hydraulic table feeds available; one shot lubrication; speed and feed changes through pick off gears; only two operating levers.

The machine is arranged for the application of multiple spindle heads and rotating indexing table. Feeds applicable to either the spindle or the table range from .005 to .125 in., while spindle speeds range from 100 to 600 r.p.m.

Screw Machine Tool Slide

THE tool slide of the new four-spindle, 1¼ by 6 in. automatic screw machine developed by Greenlee Bros. & Co., Rockford, Ill., and briefly mentioned in *Automotive Industries* of Oct. 1, is operated by a rack attached to the slide and intermittent gearing between the ways, combined with a plate cam for positioning the slide at the ends of its stroke. The quick return, approach and feeding cycle is controlled by adjustable dogs operating clutches.

Spindles are mounted on four Timken bearings, the spindle carrier being a one-piece casting. Indexing of the carrier is by a combined Whitworth crank motion and a Geneva movement driven from the main gearbox. Indexing and stock feeding take place between the fourth and first positions. The chuck closing spools at the rear of the spindle are of three pieces automatically lubricated. The spool rotates on its bronze body.

Four cross slides are provided. Movement is through rack and segment arms controlled by pick off cams and two rollers. Independent feeds are available on all slides while their maximum travel is 1¼ in.

All gearings and shafts are of alloy steel, heat-treated and mounted on ball or roller bearings. Spindle speeds range from 250 to 1200 r.p.m., with feeds from .002 to .015 in. per revolution. A gear oil pump is located in the bottom of the speed box. A self-contained coolant system is applied.

Gibbs Welding Press

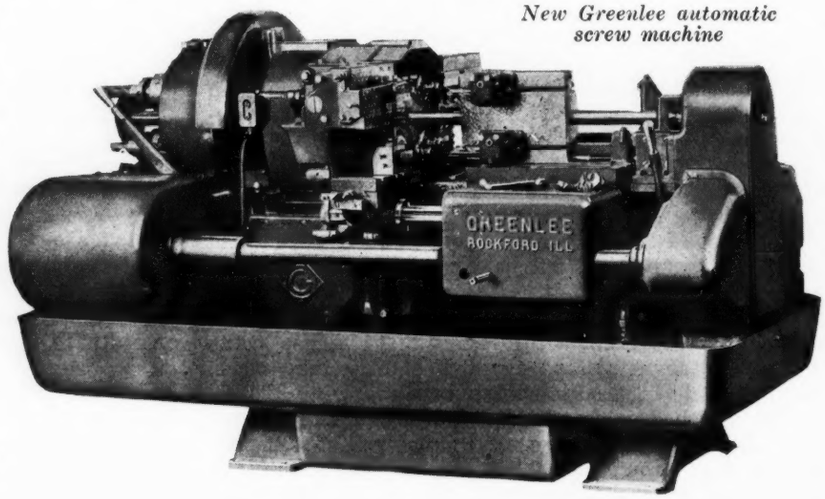
A MACHINE combining the functions of a spot welder and a punch press has been evolved by the Gibbs Welding Machine Co., Bay City, Mich. Owing to a special design of the transformer and a consequent more rapid rise of the welding current, it is claimed the weld can be made in a small fraction of the time heretofore necessary, and before the outer surface of the sheet has time to soften. This eliminates depressions in the outer surface, warpage and discoloration.

Gibbs welding press

The welding press has a smooth toggle action which quickly brings the welding points lightly into contact with the work, and gives a final forging pressure which can be increased as desired. The usual hammering of the copper points is said to be absent, which not only insures longer life to moving parts, but, together with the rapid rise in the welding current preserves the welding points and makes frequent redressing unnecessary.

This new welding machine is particularly adapted for use where light parts have to be welded to heavy ones, and is said to be ideal for finely polished work such as automobile bodies, automobile parts, etc.

New Greenlee automatic screw machine



Parts, Accessories and Production Tools

Continuous Conveyor Furnace

THE furnace herewith illustrated, which is manufactured by the W. S. Rockwell Co., 50 Church St., New York, provides a method of annealing or heat-treating steel or other metal parts without the use of pans or trays, under conditions that permit continuous charging and discharging and individual exposure of the parts.

An alloy metal conveyor operating within the furnace permits charging at random and movement of the parts without distortion through the furnace, and delivery to a shower or bath for cooling. For normalizing, the stock is cooled individually by the circulation of air.

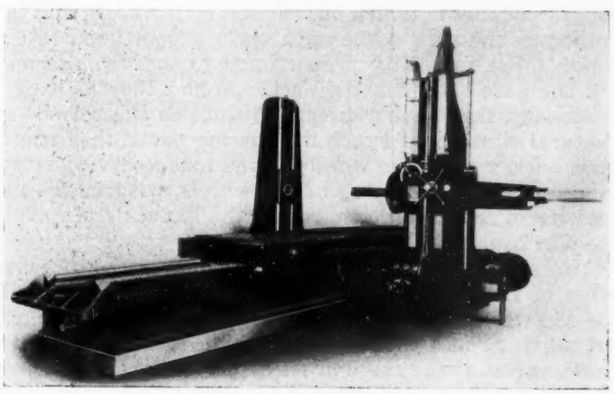
Individual exposure permits uniform application of heat to each part, as well as uniform cooling. Time and rate of heating, and temperature are automatically controlled. Rates of heating and cooling may be varied to suit requirements. Provision may be made for discharging from inside the chamber or through the working opening.

The heating chamber is made materially larger than the charge in order to avoid local heating, and is designed to maintain a uniform pressure of the atmosphere on the floor. Spent gases are utilized to preheat the stock and to preheat the air for combustion when fuel is employed as a source of heat.

Advantages resulting from the non-use of trays are that the heat which is carried away by the trays is saved, that the charges are not packed closely and high, that the labor of handling trays is eliminated and that working conditions are more comfortable. These furnaces are built for either electric or fuel heating.

Giddings & Lewis Machine

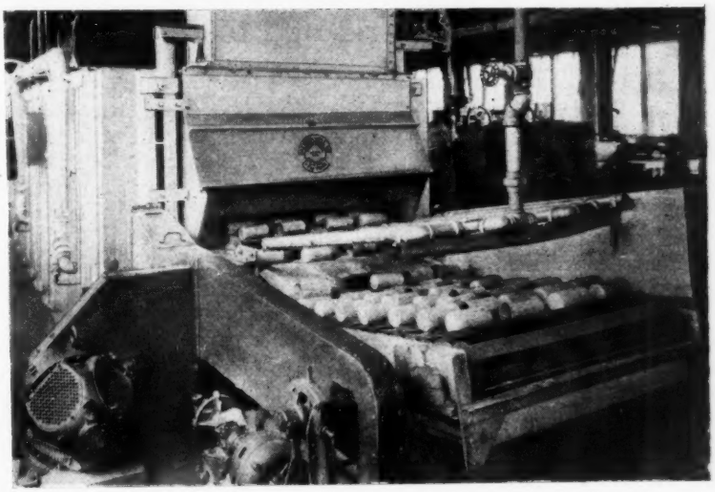
A NEW planer-type horizontal boring, drilling and milling machine, No. 45-P, is announced by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., and is said to combine the precision of a well-built table-type machine with the range of a floor-type machine.



Giddings & Lewis horizontal boring, drilling and milling machine

This machine embodies the standard spindle head, as well as the feed and transmission unit and the ball-bearing speed box with Twin-Disk clutch control, these latter parts being attached to the massive bed.

The complete machine is made up of three main units, bolted, dowelled and tongued together. The head, column and all the sub-units for the speed, feed, etc., constitute one unit. The end support and its bed, on which it can be moved back and forth and clamped in any desired position, is another unit that is placed on the opposite side of the table. The planer bed and table, placed at right angles to the spindle, comprise the third unit.



Discharging end of Rockwell conveyor furnace
Herbert steering damper

The end support, the column and the bed are of the same general design as the standard No. 45 except that they are much larger and considerably heavier. On the end support the guide block always moves up and down in unison with the head.

The table and bed are of extra heavy construction, provided with large V-ways and force feed lubrication. The machine is arranged for hand and power feed and rapid traverse in either direction; also with hydraulic clamps for clamping the table in any desired position. All are conveniently controlled from the natural operating position of the machine. A particular advantage claimed for this type of machine is that even for long cross travel of the table, the table does not overhang its bearings but is always supported its full length. The table and head movements can be arranged with the G. & L. horizontal boring machine precision measuring device.

Snubberettes for Seats

ACKERMAN-BLAESSER-FEEZEY, INC., of Detroit, has introduced the "Common Sense" seat snubberettes for use on the front seats of coaches. The device consists of a spring which either slips on over the rear leg of the seat or is screwed on in place of the leg. It is claimed that this adds much to the comfort of riding. The springs are finished in a combination of black enamel and nickel.

Hydraulic Dampers are *Recommended for* "Shimmy" *and* "Waddling"

Two principal types of instability of the front end of an automobile are analyzed by M. de Lavaud in paper contributed to French Academy of Sciences.

M. SENSAUD DE LAVAUD, who is well known in the engineering world through his invention of a method of casting iron pipe centrifugally and his development of an automatic continuously variable transmission for automobiles, has recently devoted his energies to a study of the causes of shimmy, pseudo-shimmy and "waddling," and has contributed a paper on the subject to the French Academy of Sciences, which appeared in the Transactions of the Academy for June 27 and July 25. The paper is of a rather mathematical nature, but M. de Lavaud prepared a review of it for *La Technique Moderne* on which the following is based.

Experience has shown that abnormal vibrations of the front end of an automobile are characterized particularly by a pronounced oscillation of the front axle between the tires and the springs, around a longitudinal axis. At the same time the two front wheels are subjected to a conjugate flapping around the knuckle pins, which communicates an alternate rotary movement to the steering wheel and causes the car to follow a zig-zag course. Sometimes the intensity of these phenomena is sufficient to cause successive rebounds of the front wheels from the ground in a frantic rhythmic dance.

Other motions superpose themselves on the ones described, such as a translatory movement of the axle, rolling, pitching and galloping of the chassis. These motions are secondary or parasitic and without noticeable interference on the fundamental movement. The analysis, therefore, should bear on the natural and forced motions of the front axle assembly around a longitudinal axis through its center of gravity. The conclusions arrived at are so definite that they completely explain the results of observation which often are disconcerting.

A Double Oscillator

The front axle assembly when designed along conventional lines constitutes a double oscillator with two degrees of freedom. The one corresponds to an oscillation of the axle and the wheels between the tires and the springs; the other makes use of the ability of the wheels to oscillate around the knuckle pins, either carrying along the steering wheel or due to flexibility in the steering linkage.

Moreover, the separate oscillators, axle and wheels, react on each other by gyroscopic reaction, it being impossible for one to move without carrying along the other. We therefore have the case of a double oscillator with reciprocal reactions.

In reality, if the analysis were to be quite rigorous, we would have to consider a triple oscillator with three degrees of freedom, the elements of which are the wheels, the axle and the chassis. The latter, in fact, in its rolling motion due to the alternate centrifugal forces, reacts on the axle through the springs. However, owing to the fact that the mass of the loaded chassis is very large in comparison with that of the axle assembly, a sufficiently high degree of accuracy is achieved by considering the chassis as relatively immovable. This leads to a consideration of only two fundamental degrees of freedom of the front assembly.

Every time the axis of rotation of a rotating body is moved angularly (the wheels in this case) a gyroscopic couple results, which is proportional to the angular speed of the body, to that of the angular movement of its axis, and to the moment of inertia of the body with respect to its axis of rotation.

Three Gyroscopic Couples

Three simultaneous deviations produce in the front axle the three fundamental gyroscopic couples: The first is that of the axle; it produces conjugated precessions of the two front wheels around their knuckle pivots. The second, resulting from this common precession, results in a resisting couple opposing oscillation of the axle. The third results from the gyrations of the vehicle as a whole in its zig-zag movement; it gives rise to a gyroscopic couple acting on the axle.

The second gyroscopic couple vanishes when the axle reaches the extreme positions in its oscillating motion. At that moment there is no acceleration of the periodic precession of the wheels, and their speed is therefore a maximum. The motions of the wheels and of the axle therefore are out of phase by 90 deg., the amplitude of one motion being proportional to the speed of the other.

It results from the foregoing that the two first gyroscopic couples, of which one acts on both wheels, and the other on the axle, while apparently proportional to the speeds, are in reality proportional to the displacement of the part on which they act. Acting thus as elastic reactions, they have a direct influence on the periods of natural vibration. At each instant, moreover, they transmit energy from the wheels to the axle and vice versa, conjugating the flapping of the wheels, without the necessity of causing the tie rod or the kknuckle pin angle to play a part.

If now it is observed that the angular speed of gyration of the vehicle is proportional to the locking angle of the wheels, one may conclude that gyroscopic couple of vehicular movements, acting on the oscillations of the axle, varies as the speed of its displacement. It is known that under these conditions it does not affect the periods which must be arrived at without it. It is shown by M. de Lavaud, however, that it enters directly into the

IN this article it is shown that there are two principal types of instability of the front end of an automobile. Sometimes the front wheels will vibrate violently around the steering pivots, a phenomenon to which the term "shimmying" has been applied, while again the front axle assembly, including the wheels, will vibrate in a vertical plane around a horizontal axis through the center of gravity of the assembly. The author calls this "waddling," while English writers have referred to it as "tramping."

Both are phenomena of synchronism between vibration-exciting causes and the natural periods of the vibrating assemblies. These periods for front axle assemblies have been substantially doubled (and their frequencies halved) by the adoption of front-wheel brakes and balloon tires, and thus made the rate of free vibration of the assembly sometimes equal the rate at which impulses are received at regular driving speeds.

The problems of shimmy and waddle may be attacked either by changing the design so as to bring them outside the range of driving speeds, or by introducing damping forces. An increase in the distance from the center plane of the wheel to the steering pivot axis and an increase in the inclination of the pivot change the speed of shimmying. As a damping means a so-called hydraulic damper (similar to an hydraulic shock absorber) is recommended. The most radical remedy, in the author's opinion, for both shimmy and waddle, is independence of the front wheels, as regards both suspensions and steering connections.

stability of the vibrations, and its role from this point of view is important.

Principal Vibrations

Any natural vibration of an oscillating system with reciprocal reactions results from the superposition of simple vibrations, called principal vibrations, equal in number to the degrees of freedom. Each principal vibration may be obtained separately if the initial displacements of the oscillators are in fixed proportions with one of them. There are as many series of these proportions as there are principal vibrations, the various oscillators then vibrating with the same period. The front axle assembly thus possesses two distinct principal vibrations which may be superimposed without interference.

When the axle passes through its median position, one of the front wheels is in its extreme position to the right, the other in its extreme position to the left. This observation is fundamental.

The principal periods, calculated without taking account of friction and of the damping action, are the roots of an equation of the second degree containing, symmetrically, the imaginary individual periods T_e and T_r of the axle and the wheels, taken separately. As a rule, one of the roots is quote close to T_e and the other to T_r. In the one case it is the axle which vibrates most; in the other case it is the wheels. Moreover, if the periods of the axle and the wheels vary, together or separately, the principal periods, without ever becoming equal, may change continuously, one approaching successively to T_e and T_r, while the other does the reverse. This continuous change is a characteristic of principal vibrations and is met with in dealing with phenomena of resonance.

The period T_e depends chiefly on the weight of the wheels and on the elasticity of the tires; roughly, it has been doubled by the adoption of low pressure tires and front wheel brakes. The period T_r is a function of the weight of the wheels, of the distance between steering pivot and the center plane of the wheel, of the value of the pivot angle, of the elasticity of the steering linkage, of the reduction ratio of the steering gear and of its degree of reversibility.

Stability of Principal Vibrations

The gyroscopic couple due to vehicular motion, which is proportional to the deviation of the front wheels, is opposite in direction for the two principal vibrations, since for the same position of the axle the wheels are forced over to one side for one of them and to the opposite side for the other. It is shown by the calculations the vibration of the axle will be excited for one principal vibration, that of the highest frequency, while the vibration of the lower frequency will be dampened out, this damping effect being superimposed on the natural damping actions.

In the two cases the successive amplitudes of the axle and the wheels are multiplied by an exponential factor, for which the time coefficient is negative for the vibration of lesser frequency and positive for the other. In that case it is the factor of excitation, which grows slightly more rapidly than the cube of the speed and in inverse proportion to the difference of the squares of the principal frequencies. Instability becomes manifest when this factor dominates the natural damping and the friction.

On the one hand, there is a damping effect on the axle due chiefly to the deformation of the tires; on the other hand the front wheels in their motion around the steering pivot are damped as a result of the inclination of the pivot. In fact, when describing a curve, the center of gravity of a vehicle is subjected transversely to a centrifugal force which is proportional to the angle of the front wheels, and also to an inertia force varying as the speed of deflection of the wheels. The latter is the cause of lateral reactions of the ground on the front wheels, which are of a damping character.

It is also shown that the damping effect on the wheels and on the axle are effective for one principal vibration each, with little interference. Under these conditions the damping force of the vibration can be simply subtracted from the exciting force. If the highest frequency of vibration is close to that of the wheels, the rather strong damping force on the wheels will predominate over the exciting force if the angle of the steering pivot is considerable, and stability will be the general rule. This, however, corresponds to a steering mechanism of little elasticity, which is unfavorable from the standpoint of shimmy with balloon tires and front wheel brakes.

When, on the other hand, the higher frequency of vibration is close to that of the axle, instability is possible, from a certain fixed speed upward, as soon as the exciting force which increases with the speed, exceeds the constant damping force. It may be pointed out that under these conditions the use of balloon tires and front wheel brakes, which almost halves the frequency of vibrations induced, has permitted this phenomenon to occur at normal speeds.

Finally, M. de Lavaud has shown that friction dampers never render instability entirely impossible but merely tend to suppress it. It is necessary, moreover, in order that successive oscillations of the axle and the wheels may be divergent, that they be excited with an initial amplitude which must be the greater the more powerful the damper.

Pseudo Shimmy

Under these conditions, and always starting from a certain fixed speed, it is only necessary that the inequalities of the road induce vibrations of sufficient amplitude in order that successive oscillations become constantly amplified, giving rise to a phenomenon very similar in appearance to shimmy. If the speed is increased the disturbance becomes exasperating; the car must be slowed down, and it will then quiet down. The original speed may then be resumed, provided a heavy road shock does not cause a repetition of the phenomenon. A sudden turn, inclining the axle, may start a pseudo shimmy in the same way. This is not a case of resonance, and the degree of balance of the wheels is not a factor.

To obviate this, the excitation factor may be lessened by separating as far as possible the two principal frequencies, by adopting, in the case of balloon tires and front wheel brakes, a steering linkage of considerable elasticity and a reversible steering gear. The cushioning of the steering arm in a spring connector should be studied with care. It is also advantageous to fit the steering gear with a "soft" hydraulic shock absorber.

It is, moreover, essential that the oscillations of the axle be sufficiently damped. The use of rubber in the suspension, such as now obtainable, is very favorable. It is also possible to use hydraulic or compound dampers, but their oil-tightness is difficult to insure.

It is quite obvious that vibrations can be induced only by instability or resonance, which latter will now be investigated. The disturbing effect is generally due to lack of balance, most frequently of the road wheels. The period of the exciting force is therefore one revolution of the road wheels and there will be resonance as soon as that period coincides with a principal period of the front axle assembly, calculated without regard to friction and damping forces.

The Two Critical Speeds

The equation of the second degree for the principal period then furnishes two critical resonace speeds. One of these, ω, is in general close to the imaginary speed ω_e which would be produced by the resonance of the axle alone. This is the speed of shimmy. The other ω' differs little from the imaginary speed of resonance ω_r of the wheels, taken separately; this is "waddling." In the one case the resonance seems to affect principally the axle; in the other, the wheels. These two speeds ω_e and ω_r are readily calculated. The former is the less the heavier the wheels and the lower the inflation pressure. It is for this reason that shimmy never caused any trouble until balloon tires and front wheel brakes came into use. The stiffness of the springs, at least if not excessive, has little influence, but is opposed to the rebounding of the wheels.

The speed ω_r is the lower the heavier the wheels, the farther the pivots from the center plane of the wheels, the smaller the inclination of the pivots and the more elastic and the more reversible the steering mechanism. The two parameters ω_e and ω_r entry symmetrically in the equation of critical speeds, and any variation in either one or in both entails a continuous variation in the critical speeds without the two ever becoming equal. Thus the "waddling" may be converted into shimmy and vice versa in a continuous manner.

Moreover, if the inclination of the steering pivots is within the usual limits of 2 or 3 deg., the critical speeds substantially obey the following fundamental laws of similitude:

If ω_r remains proportional to and smaller than ω_e, the speed of shimmy will be proportional to and greater than ω_e while the speed of waddle will be proportional to and lower than ω_r. "Waddling" will be observed first and shimmy later on. That was generally the case on old style vehicles with high pressure tires and without front wheel brakes. A steering gear without play, sufficiently rigid and irreversible and, if necessary, an increase in the inclination of the steering pivots usually prevented waddling at ordinary speeds, so that there was no perceptible critical speed.

But the adoption of low pressure tires and front wheel brakes had the effect of cutting ω_e in half, with the result that with the same steering gear, ω_r has become greater than ω_e. Under these conditions, if their ratio is constant, the speed of shimmy remains proportional to and smaller than ω_e and that of waddling proportional to and greater than ω_r. The dreaded permutation of critical speeds has taken place and shimmy occurs first, at touring speeds, distinct, violent and absolutely unaffected by the pivot inclination. The speed of waddling is then very high and generally outside the driving range.

Reestablishing the Harmony

It would thus appear that, in order to be able to benefit by the advantages of low pressure tires without annoyance from shimmy, it is necessary to reestablish the disturbed mechanical harmony by lowering ω_r relative to ω_e. In other words, use must be made of a steering gear which is more elastic and more reversible and this in direct proportion to the lowering of the tire pressure and the increase in wheel weight.

We are then back to the original case of similitude. But we cannot avoid waddling at a speed which will be the lower the more flexible the steering and the more reversible. In fact, owing to the smallness of ω_e, it cannot be eliminated before having transformed it into shimmy at touring speeds. However, since it is strongly damped as a result of the inclination of the steering pivots, it is not very pronounced. Under these conditions shimmy is not encountered up to much higher speeds, sometimes outside the driving range. If this is not the case it may be further removed and eliminated by increasing the inclination of the steering pivots, which has a very pronounced effect upon it when it forms the second critical speed. This increase in the inclination must be limited, however, in order not to make the waddling objectionable.

In fact, if the angle of the steering pivots is increased, the speed of waddling increases, which tends to increase the energy put in play. On the other hand, the greater damping at the wheels tends to keep it moderate. There is for this reason an optimum of 2-3 deg. for the pivot inclination, which is the higher the heavier the wheels and the lighter the car. The limits on the steering pivot angle are therefore strict; if one departs from them materially one sees the waddling reappear and evolving into shimmy.

It should also be pointed out that it is advantageous to move the pivots farther away from the center plane of the wheels, thereby lowering $_r$. In the case where waddling appears first, it is produced at the lowest

speed and shimmy at the highest. This is exactly what we are after. Moreover, in contrast to general opinion, the steering is improved thereby.

If, for instance, the right front wheel passes over an obstacle, a violent gyroscopic reaction is felt at the steering wheel, independent of the distance of the pivot tending to swerve both wheels at the same time from the right to the left. The effect of the tangential percussion received from the ground is subtractive and proportional to the distance of the pivots. The latter, however, must not be made excessive, in view of the possibility of unequal braking and of front tire blowouts.

Damping has no effect on the value of the critical speeds; it merely attenuates their manifestations and makes the field of resonance stand out. It must also be taken into account that it may be considerably diminished by the excitation factor, a very intense shimmy sometimes resulting from a very slight unbalance of the wheels.

Finally, the conventional friction dampers, if they are set up tight enough, may check resonance by rendering the oscillations converging. As all frictions act indiscriminately on the two principal vibrations, they may thus prevent the manifestations of both shimmy and waddling, without in any way affecting the theoretical values of the speeds at which they occur.

Unfortunately the parts between the chassis and the axle are not constant, because they are subjected simultaneously to angular oscillations and oscillations parallel to the axle. Under these conditions they damp soon one and soon the other, but never both at the same time. Their effect on the angular oscillations of the front axle assembly is therefore essentially discontinuous.

On the other hand, hydraulic dampers, the effect of which depends on the speed of their displacement, are capable of damping at the same time both angular and linear oscillations.

In closing M. de Lavaud points out that since a vibration of resonance includes both natural and forced vibrations, it is certain that pseudo-shimmy may be inaugurated by shimmy. The former then superposes itself on the latter, remarkably increasing its intensity. When the critical speed is passed the pseudo-shimmy remains and can be gotten rid of only by slowing down.

Finally it should be pointed out that the energy involved in shimmy, pseudo-shimmy and waddling is supplied by the engine. The front wheels execute regular flapping actions on the ground, receiving periodic lateral impulses. These are the cause of a supplementary resistance and consume power.

Conclusions

Maintenance of mechanical harmony in modern passenger cars requires that the steering gear be adapted to the use of low pressure tires and brakes on the front wheels. It must be sufficiently elastic and reversible. M. de Lavaud even thinks that complete reversibility is advantageous, which may be rendered practical by providing the steering gear with a soft hydraulic damper. Furthermore, if complete elimination of shimmy necessitates it, the removal of the pivots from the center planes of the wheels and an increase in the inclination of the pivots are advantageous.

Damping of the oscillations of the axle can only attenuate shimmy, but may prevent completely the instability of vibrations. The friction of the damping devices may minimize waddling and shimmy, but its efficiency will not be complete except with separate dampers for the angular and parallel oscillations of the axle. Friction, on the contrary, never prevents instability of the vibrations, but the amplitude of vibration which determines this instability increases with the pressure to which these dampers are set up.

Finally, abnormal vibrations of the front axle assembly are due to a play of gyroscopic reactions between the axle and the wheels.

The solution of the future therefore is independence of the front wheels. This construction can only improve the comfort of steering, because the shocks felt at the steering wheel are almost exclusively gyroscopic percussions.

Congress for Testing Materials

A BRIEF report of the International Congress for Testing Materials, which was held at Amsterdam, Holland, Sept. 12 to 17, appears in *The Engineer* of London. The holding of the Congress marks an attempt to revive the International Association for Testing Materials which existed prior to the war, which had permanent headquarters at Vienna and held an international congress every three years. Through the agency of the association and its numerous international committees, continuous collaboration on specific subjects was carried on. However, signs of discord in the ranks of the association and of the supporting bodies had made their appearance before the war led to its disappearance, particularly because at the New York Congress in 1912 the association had gone in rather strongly for international standardization of specifications, which industrial organizations in Great Britain considered contrary to their interests.

The congress held at Amsterdam was organized by a committee consisting chiefly of Dutch and Swiss testing engineers. A preliminary meeting was held in Zurich about a year ago, at which the Amsterdam Congress was decided upon. The congress was attended by over 500 delegates from 17 countries, including most of the better-known men in this field of engineering. In spite of the language difficulty and the fact that the program was rather overcrowded with papers and "reports," the meeting was generally voted a great success. In fact, the general impression afforded was one of international amity and cooperation, with—in general—an indication that during the years in which international cooperation has been suspended, workers in different countries have arrived at views which, if not identical, are at least much less divergent than might have been anticipated. In several instances similar methods and ideas had been arrived at independently, and international agreement seems less impossible than it did 15 years ago. This happy state of affairs, however, is to some extent the result of the total exclusion of the whole subject of international standard specifications from the work of the Congress.

Four principal addresses were delivered to sessions of the full congress by one representative each of America, France, Germany and England. T. D. Lynch, of the Westinghouse Electric & Mfg. Co. of Pittsburgh, in a paper on "Materials Testing as a Stimulus to Research," showed how in a variety of ways the data as well as the problems of testing give rise to new problems both in regard to the design of structures and machines and to the improvement of materials.

At what might be called a business meeting arranged by the organizing committee, a draft constitution for the new association was adopted. Complete unanimity was arrived at, including the decision to hold the next congress at Zurich and the appointment as temporary honorary secretary of Prof. Ros, of the Technical High School at Zurich.

THE FORUM

Do Automobile *Instruction Booklets* Tell *Too* Little?

Correspondent, commenting on Ellis Parker Butler's recent article, thinks possibly they do.

Editor, AUTOMOTIVE INDUSTRIES:

It may be true that it is the "pink paint" or "silk sofa effect" that sells *some* automobiles to *some* people and it may be that some cars are as trouble-free as Mr. Butler's. But if so, one wonders why car owners debate endlessly concerning the merits of purely technical details of design; aluminum versus cast-iron pistons, L-head, versus valve-in-head, etc., and why everyone condemns the work of the average service station.

As an automobile user, I have grieved as much as Mr. Butler over the contents or rather the lack of contents of instruction booklets. I am one of those individuals who wants to take care of his own car, or, where that is not possible, to know what the man in the local garage is going to do when he starts to do something. Perhaps I am in a minority, but I seriously doubt it. If a census were taken of the backyards of the nation ample proof would appear to the contrary.

Of the 20,000,000 car owners, between 5,000,000 and 10,000,000 of them are trying to make needed adjustments—or at least to discover how on earth they should be made. This is the man that needs the instruction book—isn't he a big enough part of the market to deserve some consideration by the manufacturer?

A habit I adopted some years ago, and I know many others who have since adopted it at my suggestion, is to read the instruction book as one guide in selecting a new car. If, after the prospective buyer puts down the list of eligibles—cars from which he is going to make his selection—he will go around and borrow the instruction book of each make and read it, he will be able to select his car with considerably more intelligence. This is cited as one more reason why the instruction book deserves to be right.

The tendency that Mr. Butler indicated as desirable, namely, to eliminate the instruction booklet, needs no urging—it is happening too fast anyway. There are three classes of so-called instruction books from which I have suffered.

First, the instruction book written by the advertising agent. Its purpose is to "sell" the merits of the car but it doesn't give the owner any information concerning its construction or operation, usually because the writer didn't really know anything about it. This book may be harmless to those who never refer to it, but to the user who turns to it in an emergency or in the normal course of caring for his car, the extent of its sales value will be usually negatively indicated by a vigorous cuss—at failure to find the desired information.

The second kind of instruction book assumes that all owners are babies—utterly ignorant of the principles underlying that simple mechanical apparatus known as an automobile. It refers him at all points to the dealer or so-called service station. This is one of the kinds of books mentioned by Mr. Butler.

I have that kind of book in my present car. The car developed a looseness in the drive shaft. The book said nothing about it. This might have been a bearing, a loose nut or a loose pinion. A simple elevation showing the construction and the assembly of its interior parts would have answered the question immediately but since such a simple illustration was not thought of by the writer of the instruction book, I went to the dealer's service station. They too were without any diagram

AUTOMOBILE instruction booklets were made the subject of a humorous article by Ellis Parker Butler in *Automotive Industries* of Sept. 10. The article was a good-natured criticism of the highly technical phraseology that is often found in instruction booklets, and the fact that they frequently give the car owner the impression that there are too many things to get out of order.

The accompanying communication to "The Forum" was inspired by the Butler article. It also criticises instruction booklets, but chiefly for the reason that they say too little or are too general in character.

We would be glad to hear from others who may have opinions on the subject.

—Editor.

showing the assembly of these parts and it didn't take much questioning to learn that the head mechanic really did not know the assembly in question. Apparently the

"The kind of instruction booklet that I would like to have is the kind that every garage repairman would also appreciate. It would be mostly illustrations"

servicemen are expected to keep acquainted with changes in model by tearing down customers' cars to find out how they are built!

The third kind of instruction book—which is relatively rare—is one which the service department has revised each time it is reprinted. Every possible trouble, whether it has come up in every car or in every thousandth car is covered in this sort of booklet. It is the best of the instruction booklets now available but it could be better. It is usually in small type with many words and few illustrations.

The kind of instruction booklet that I would like to have is the kind that every garage repairman would also appreciate. It would be mostly illustrations. If the assembly of the part was visible in the car it would not be treated in the instruction book. But illustrations would tell how the insides looked. The text would explain clearly how each disassembly and adjustment should be made. The urge to take the works apart to see what they looked like inside would be reduced because the taking apart would have been done pictorially in the booklet, by the manufacturer.

I have asked dozens of owners and many garagemen about instruction books. The desire to have workable information appears to be universal. Why the manufacturer's desire to meet the need is almost zero has been beyond my understanding.

H. F. MARSHALL.

Torque Reaction Loads

Editor, AUTOMOTIVE INDUSTRIES:

On page 203 of your issue of Aug. 6, Mr. Heldt in his article on six-wheelers says with reference to the Scammell design: "At first glance one would be inclined to think that in this case torque reaction would be taken up by the gear housing, but such is *not* the case."

The first *several* glances in this case are apt to lead to wrong conclusions and the matter seems worthy of more careful analysis and consideration.

At first glance I was convinced that the gear housing *did* take a torque reaction as a result of shift in load from one pair of drivers to the other and my first impression was that the load shift was such as to increase the load taken by the leading axle. (The direction of torque on the center gears fooled me.) Second thought, of course, showed this impression to be incorrect, hence the closer analysis shown by the sketches.

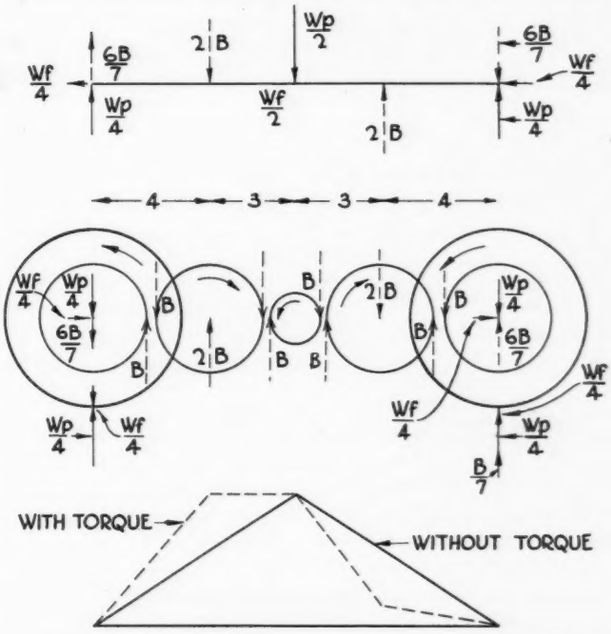
At the top of the sketch I have shown the forces acting on the housing when considered as a free body; at the center, forces acting on the various gears and wheels, neglecting (for simplicity's sake) to show some of the forces transmitted through the center shaft. At the bottom is shown the bending-moments diagram for the housing. Solid lines indicate conditions with load but no torque, while the dashed lines are with both load and torque to give tooth pressure *B*.

Torque Equally Divided

If we assume twice as many teeth on the wheel gears as on the center gear, we must be careful to remember that the torque on each axle is only equal to that of the center shaft and *not* twice that amount. This, of course, is under the assumption that the wheels do not slip and therefore that the torque is equally divided between axles.

With the dimensions assumed, it may at first be confusing as to why the torque should cause a *de*crease in the force between trailing axle and housing while at the same time causing an *in*crease in load on the corresponding tires. It is due to the fact that, in spite of the slightly increased load on the tire, it is very largely transmitted from housing to tire through the idler gear instead of direct to the axle.

The total load (vertical) at the center of the housing



Sketches showing (at top) the forces acting on the housing when considered as a free body; (center) forces acting on the various gears and wheels, and (bottom) the bending-moments diagram for the housing

is not altered by the torque, and hence the bending moment at that point remains unaltered. The change in load at the idler shafts and axle shafts accounts for the changes in bending moments at all points other than the center, increasing them over the one half and decreasing them over the other.

M. R. WELLS.

White Adds 1¼-Ton Truck Chassis to Round Out Line

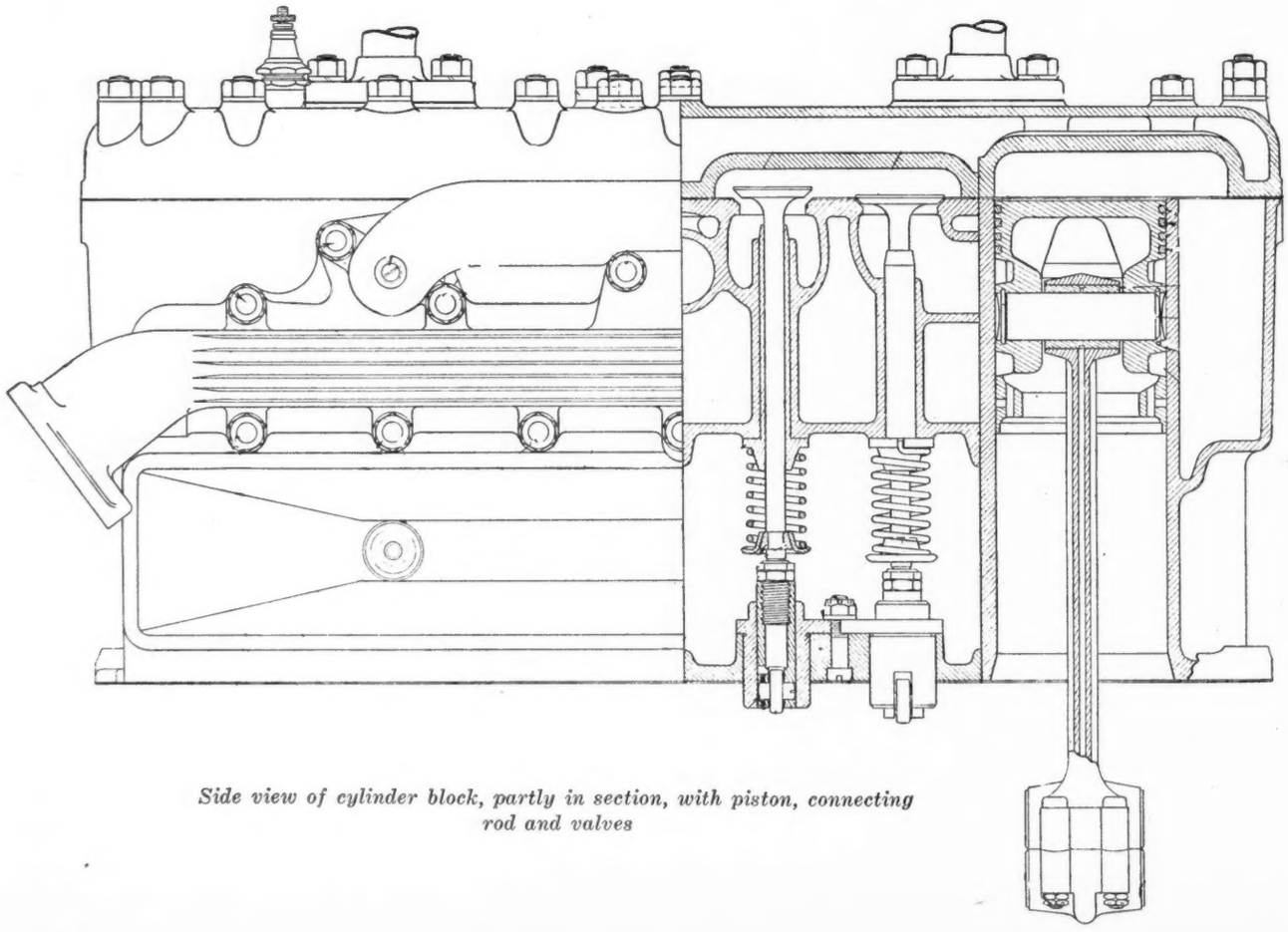
New job is powered with four-cylinder L-head engine and has overall length of 200½ in. Price $2,725.

TO round out its line, the White Co. has added a 1¼-ton truck chassis listing at $2,725. The truck, designated as Model 57, is powered with a four-cylinder L-head 4 x 5¾ in. engine, developing 47 hp. at 2000 r.p.m. This engine, Model GRC, is identical with the four-cylinder engine used in the 2-ton chassis.

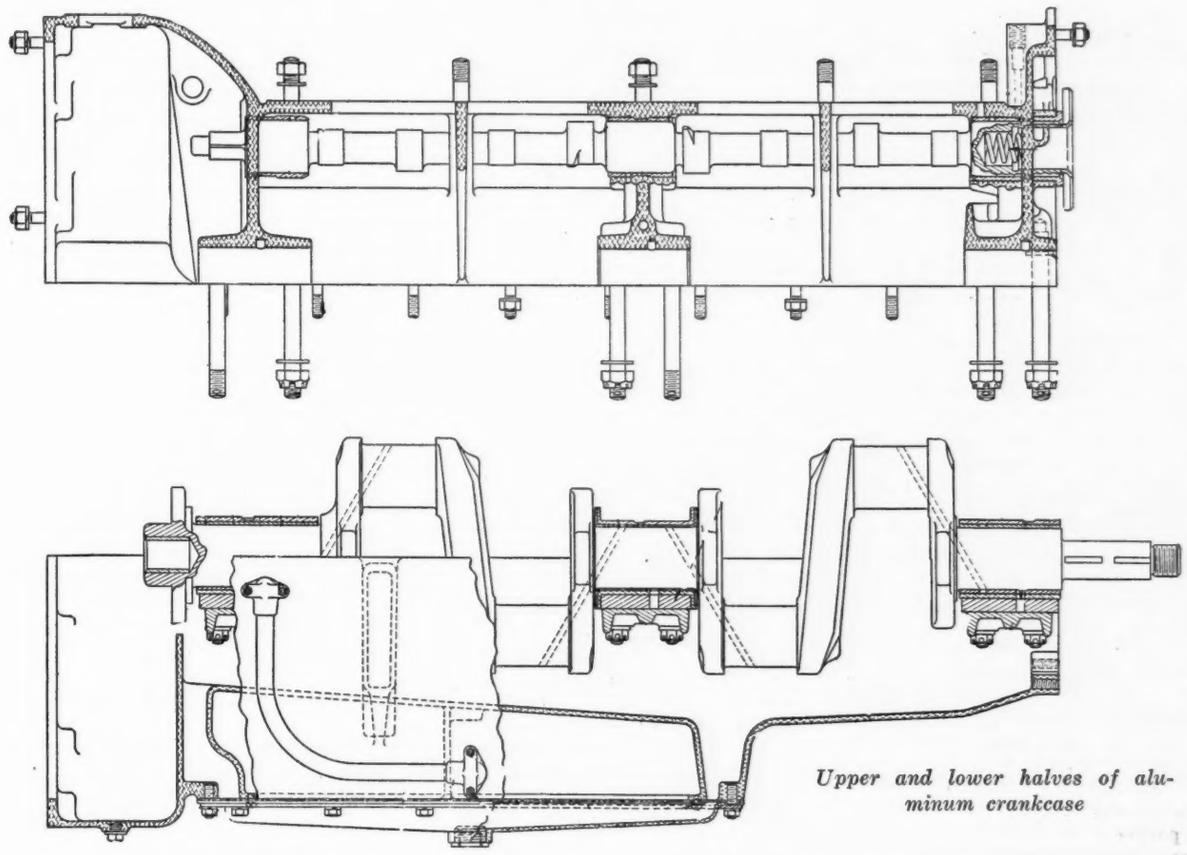
Cylinder blocks are of chrome-nickel iron and are separate from the crankcase. Their combustion chambers are completely machined. The engine has a three-bearing crankshaft and full pressure lubrication to main, connecting rod, camshaft and piston pin bearings. Main bearings are 2¼ in. in diameter, and 3 25/32, 3½, and 4 15/32 in. long (front to rear) respectively. Crankpin journals are also 2¼ in. in diameter, and have a length of 2¾ in. The drilled rod itself is 12⅛ in. between centers and carries the 1 3/16 in. piston pin in a bronze bushing. Connecting rod lower bearings are diamond-bored.

Aluminum alloy pistons are used, with three 5/32 in. compression and one 3/16 in oil control rings. Valve head clear diameters are 1 25/32 in. for the chrome-nickel inlet and 1 9/16 in. for the silicon chromium exhaust valves, both having ⅜ in. lift. Camshafts are mounted in three 1-15/16 in. bearings, large enough to clear the cams, so that the shaft can be removed from the front end.

Cooling is by a gear-driven centrifugal pump with cellular core radiator mounted in a cast aluminum shell with the usual White flexible supports. Fuel feed is by vacuum from a 20-gal. tank under the driver's seat to a Zenith compound jet, double venturi 1¼ in. carburetor. A hot spot is provided on the cast-iron intake manifold.



Side view of cylinder block, partly in section, with piston, connecting rod and valves



Upper and lower halves of aluminum crankcase

A single-plate clutch of White design operating in oil is included. In unit with the engine is the four-speed selective type transmission with direct drive on fourth. Gears are made of drop-forged alloy steel with all shafts mounted on annular ball bearings. A semi-floating bevel gear drive rear axle is used, with provision for Hotchkiss-type propulsion. The standard rear axle reduction is 4.67 to 1, with an optional ratio of 5.36 to 1.

The service brakes are of the external type, the internal emergency brakes acting on the same drums, which have an outside diameter of 14¾ in., an inside diameter of 14 in. and are 2½ in. wide. Steering is by a White worm and sector irreversible gear provided with ball thrust bearings. Universal joints are of the metal type, and springs are semi-elliptic front and rear. Front axles have a one-piece drop-forged Elliott type I-beam center section of heat-treated steel. Ball bearings are used in the steering knuckles.

Spoked cast-steel wheels are standard, with disk wheels optional at extra cost. These carry 32 x 6 in. single cord tires front and rear. The tread is approximately standard at both front and rear. Frames are of channel-section pressed steel. The overall width of the truck is 71 in., and the overall length 200½ in. This provides for 143 in. between the dash and the rear of the frame, of which 38 in. is overhang back of the center of the rear axle. The maximum width of the frame is 34 in.

Stewart 2-Ton Truck

A NEW model 2-ton truck equipped with either a four or six-cylinder engine and with Bendix four-wheel brakes is the latest development of Stewart Motor Corp., Buffalo. The six-cylinder engine is 3½ x 4½ in. and develops 45 hp. It has a four-bearing crankshaft, full pressure feed lubrication, rifle-drilled connecting rods, water pump and thermostat. The four-cylinder engine has 4-in. bore and 5-in. stroke with pressure feed lubrication.

The four-wheel Bendix brakes are of the internal type and consist of three shoes operated inside a high carbon pressed-steel brake drum. Rear brakes are 17¼ x 3 in., while those at the front are 16 x 2 in.

Standard wheelbase is 145 in. while 160-in. and 130-in. wheelbases are also available. Tread is 59 in. Tires are pneumatic, 32 x 6 in. front and 34 x 7 in. rear, heavy-duty. Dual rears are optional.

Standard accessories include Zenith carburetor with gas cleaner and air filter; Delco-Remy ignition, generator and starter; cast tank type, tubular core radiator; 12 dry-plate clutch; standard three-speed transmission with four-speed unit available at extra cost; Ross steering gear; Timken full-floating rear axle.

The frame is of pressed steel with a maximum depth of 7½ in. The front axle hubs are fitted with Timken bearings. Chassis price is $1,895 f. o. b. Buffalo.

THE Reichsverband der Deutschen Luftfahrt-Industrie (National Association of the German Aircraft Industry) Berlin W-35, Blumeshof 17, is organizing an international aircraft exposition to be held at Berlin March 23 to April 11, 1928. The exposition will include everything pertaining to aerial navigation, such as materials of construction, machines of various types, designs, equipment of all kinds, designs and equipment of flying fields, equipment for the training of pilots, etc.

THE U. S. Customs Court has decided that parts for Diesel engines can be imported subject to a duty of 30 instead of 40 per cent.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Saturday, November 12, 1927

Factory Operations Lower, Upturn Waits Ford Action

PHILADELPHIA, Nov. 12—Motor car manufacturing continues under the level of a year ago at this time and is showing the seasonal downward trend. For all companies exclusive of Ford, the recession has been in the main orderly and business for that group has not been far from normal. A few have even been able to better their previous marks.

The October output of about 210,000 cars and trucks compares with 268,529 in September and with a total of 227,571, excluding Ford, in October, 1926. Unless Ford gets into reasonably heavy production in the final weeks of the year, no essential change in the current picture is looked for.

New car stocks are about equal to last year at this time, again excepting Ford. Production is generally being guided largely by the actual retail sales and the need of the factories to make equipment changes and make inventories. At the same time the desire to maintain sales during the seasonally slack period is being evidenced by a number of sales contests put on by leading manufacturers.

The used car situation is causing some concern, despite the fact that stocks are probably not higher than is usual for the season. Values of the second-hand vehicles have suffered heavily this year, as the prevailing trend toward more frequent introduction of new models tends to depreciate more quickly the displaced models.

Oakland 10 Months Sales Are Increased to 172,027

DETROIT, Nov. 8—Oakland-Pontiac sales in October totaled 15,674 units which exceeds by 61.6 per cent the volume enjoyed in October of last year, according to W. R. Tracy, vice-president in charge of sales. Total sales for the first 10 months of the year make 1927 the company's most successful year, Mr. Tracy declared. The October record compares with a September sales increase of 37 per cent over the corresponding period of a year ago.

Sales of Oakland-Pontiac from January to October inclusive aggregate 172,027, against 121,330 during the first 10 months of 1926. The increase of 50,697 represents a gain of more than 41 per cent over the 1926 period.

Syracuse Studies Salvage

SYRACUSE, Nov. 9—The Syracuse Automobile Dealers Association at its October meeting named a committee of four members to investigate and report on a plan of establishing a junk and salvage yard, to be owned and operated by the association.

Storz is Elected A.E.A. President

CHICAGO, Nov. 10—Arthur C. Storz, president of the Storz-Western Auto Supply Co., Omaha, was elected president of the Automotive Equipment Association at the annual convention here this week. Walter C. Hecker, vice-president of the Curtis Pneumatic Machinery Co., St. Louis, was elected vice-president.

The 11 directors elected were G. L. Brunner, A. G. Underwood, E. T. Satchell, N. H. Boynton, Elliot Chaney, W. F. Beckley, C. C. Secrist, G. H. Niekamp, C. L. Carper, E. L. Foos and L. M. White.

Jobbers from all sections of the United States brought reports of substantially increased fall business to the convention. Manufacturers exhibiting reported satisfactory sales and equipment makers particularly show indications of a record week.

Harry G. Moock, in charge of Greater Market Development, in which the association is investing approximately $250,000 a year, reported accomplishments for four months actual operation of his department which were enthusiastically received by both manufacturers and jobbers. Both divisions of the association in meetings yesterday approved the administration of Greater Market Development.

Miller Joins Diamond

CHICAGO, Nov. 10—Franklin A. Miller has resigned as vice-president of Gill Mfg. Co. to become vice-president and general manager of the Diamond Piston Ring Co., Baltimore, formerly the Warwood Tool Co., in which he has acquired a substantial interest.

Opens Detroit Branch

MILWAUKEE, Nov. 8—Kearney & Trecker Corp. has opened a new factory branch office and showroom in Detroit at 5924 Second Boulevard with R. W. Burk in charge. Mr. Burk was formerly Chicago district manager for Landis Tool Co.

G.M.C. to Disburse $65,250,000 on Common

NEW YORK, Nov. 10—General Motors Corp. directors today declared the regular quarterly dividend of $1.25 a share on common stock and an extra dividend of $2.50 a share, the former payable Dec. 12 and the latter Jan. 3. The total of the two payments aggregates $65,250,000. Regular quarterly dividends on senior securities also were declared.

A. P. Sloan, Jr., president, said the current position continued strong. Cash and marketable securities aggregate $235,000,000.

Hoagland Succeeds Hayes as Hayes Body President

GRAND RAPIDS, Nov. 9—Hayes Body Corp., following a meeting of the board of directors, announced the retirement of H. Jay Hayes as president, and the appointment of W. W. Hoagland to that position. Mr. Hayes, who has been active in the management of the automobile body business of this corporation for several years, desired to be relieved of some of his more arduous duties, and was made chairman of the board. Mr. Hoagland has been with Hayes more than 10 years.

Packard Increases Dividend

DETROIT, Nov. 9—Directors of Packard Motor Car Co. have increased the regular monthly dividend on common stock from 20 to 25 cents a share, placing the stock on a regular 30 per cent basis. An extra 1½ per cent dividend was declared to cover the months in the first quarter of the fiscal year which begins Sept. 1. Announcing the increased dividend, Alvan Macauley, president, said he was convinced that business would be active in the spring.

Paige Shows Deficit

DETROIT, Nov. 9—Net loss of the Paige-Detroit Motor Car Co. for the first nine months was $1,796,104 compared with a profit of $755,452 for the same period last year. At the end of six months, Paige reported net loss of $1,426,463, of which $1,056,510 was due to charge-offs in the second quarter.

James Cox Brady

NEW YORK, Nov. 10—James Cox Brady, a director of the Chrysler Corp. and of many other corporations, died today of pneumonia.

Ford Road Cars Increase in Number

Districts Surrounding Detroit See Cars in Transit and Demonstrations to Some Dealers Reported—Believed All Essential Features of New Car Now Approved

DETROIT, Nov. 8—Operation of the Ford final assembly line for the production of at least a limited number of test cars is attested by the more frequent appearance of such cars in the rural districts surrounding Detroit. Several of these cars have been seen in operation through different villages and they have been privately demonstrated to at least some dealers.

That there are still some mechanical changes to be made is indicated by orders this week to Akron tire makers for 30 x 4.50 tire equipment as against the 29 x 4.40 size which had been specified previously. Tire makers will require at least two weeks to revamp their molds which would hold volume production to Nov. 21 at the earliest.

It is considered likely, however, that the cars now leaving the line represent the final production model in practically all essentials. Those that have been seen are all two-door sedans and it is considered that the bodies for these are at least final production jobs. This type of body was made formerly in Ford's own body plant and it is thought likely that the Ford plant is ready to turn them out for the new model. Other closed bodies are probably from outside makers and are not as far along.

Tire engineers who conferred with Ford authorities on the tire change indicated that production of 200 cars daily will be inaugurated about Nov. 21 with a gradual speeding up to high production after the first of the year. It is understood that Ford production plans are for as high as 12,000 daily by June 1 should demand develop to require this large output schedule.

A two-door sedan observed on the road and photographed at Brighton, Mich., appeared to be about 6 in. longer in wheelbase than the Model T. It was finished in a light green and while low in appearance appeared to have increased body room. It was equipped with five wire wheels, four-wheel brakes, speedometer, oil pump, water pump, bumpers front and rear, standard gear shift and bullet type headlamps. These features were noted while the car was parked for a time at Brighton.

In general the appearance of the car was pleasing though in comparison with standard cars of other low-priced lines it was not unconventional. By comparison with the Model T, however, it is a distinct innovation. Body lines are generally graceful, the hood line being high and meeting the waist line of the body which is also much higher than in the former models. The windows are much wider than in the former models with the rear window curving as it meets the rear quarter. The roof line rises slightly to the rear quarter where it is rounded off.

Reports at the River Rouge plant are that the assembly line will probably be running soon after Nov. 15. Engines for the new car are now going through at the rate of about 1000 daily but they are being delayed in complete assembly owing to delay in getting the new aluminum alloy pistons. The die and tool rooms at the plant are in full operation but it is noted that they are making new tools and machine parts rather than dies as they were until recently.

For the present both the Model T and the new model cylinder blocks are going through on the same production line. This is probably being done to provide greater flexibility of the line for future changes. Where operations on the Model T and new model blocks require different tooling, separate machines are used adjacent to each other.

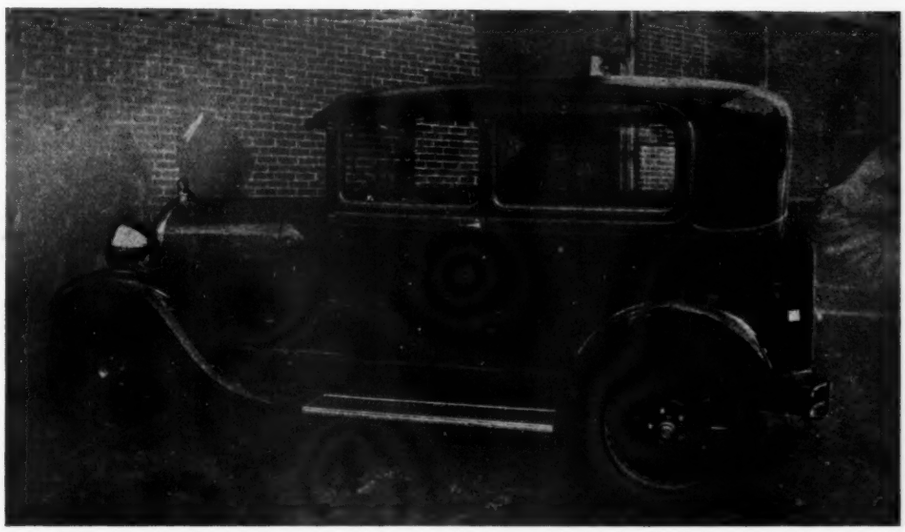
Coincident with the announcement of the new car it is expected that the Ford company will initiate a new merchandising plan. The resignation of W. A. Ryan as sales manager is taken as indicating that new selling ideas have been developed which were in conflict with Mr. Ryan's ideas. It has been reported that a feature would be a low down-payment and that yearly replacement sales would be sought. The cars replaced would be rebuilt as new to eliminate used cars.

Tire Factory Operations Increased by Ford Buying

AKRON, Nov. 9—Automobile tire production is starting up again in the Akron district, under the stimulus of spring dating orders and an improved demand from automobile manufacturers. Operations of the leading tire factories, which for the past two months have been running from 75 to 80 per cent of capacity, have increased about 10 per cent within the past week.

While no definite figures are available, it is learned that substantial orders for tires for the new car have been placed by Ford Motor Co. with the Goodyear, Firestone, Goodrich, Miller and Mason rubber companies. A report has been current that Firestone has received an order from Ford for 1,000,000 tires, but this was denied by Firestone officials.

Perhaps This is the New Ford



Cincinnati Reports October Sales 1143

Decrease of 200 From Former Year—Used Car Dealers Increase Sales

CINCINNATI, Nov. 7—New car registrations for October were 1143 compared with 1343 in October, 1926, a decrease of 200. Used car registrations for last month were 3739 compared with 3688 a year ago, an increase of 51.

In spite of the increase in the sale of used cars, as shown by the registration figures, conditions in that end of the business are regarded as bad. As a matter of fact, a great percentage of the total sales last month were made by exclusive used car dealers, and represent automobiles driven into Cincinnati from Indianapolis, Detroit, Chicago and other cities, to a large extent. Used car sales by legitimate dealers, all members of the Cincinnati Automobile Dealers' Association, were disappointing and much grief is apparent along automobile row in this connection.

General disappointment over business conditions is apparent among dealers. A sharp pick-up during the latter days of September gave rise to hope that October would see a greatly increased demand, but the registration totals for the month showed 92 new cars less than during September, and a drop of 446 used car sales.

Detroit October Sales 2908

DETROIT, Nov. 7—Passenger car sales in Wayne county for October totaled 2908 units bringing total sales for the first 10 months of the year to 48,759 compared with 71,882 for the corresponding period last year. The figures are indicative of the completeness with which Ford stocks have been cleaned up, only three Fords being sold during the month. A total of 368 commercial vehicles were sold during October bringing the figure for the first 10 months to 4583 compared with 7983 for the corresponding period last year.

The association has also released figures on new trucks titled in Michigan in September. It shows 1310 compared with 2451 trucks for the same month last year. Truck sales in Michigan for the first nine months aggregate 12,315 units.

Studebaker Drops Branch

DETROIT, Nov. 7—The E. J. Arnstine Co. has taken over the distributorship for the Studebaker and Erskine cars in Cleveland and 11 counties in northern Ohio, it is announced by the Studebaker Corp. of America. E. J. Arnstine, well known Cleveland automobile man is president of the new company. The new distributor will take over the buildings formerly occupied by the Studebaker Corp. of America, which for six years has operated in Cleveland as a factory branch.

Fort Worth Parade to Contrast Cars

FORT WORTH, TEXAS, Nov. 5—An out-of-date automobile parade will be held by Fort Worth dealers Thanksgiving week. First will come the oldest car still in service of each make, followed by the newest model. A cup will be awarded to the oldest car and to the oldest costume worn by a driver. Thirty or forty entries are expected. The object of the parade is to demonstrate the advance of motor cars in the last 20 years. Automobiles were few in Texas in 1907 and difficulty is expected to be encountered in resurrecting the models of that year. The parade will be held over the city streets and around an abandoned loop that was popular with the pioneer auto drivers of Fort Worth.

New York Dealers Oppose Compulsory Insurance

NEW YORK, Nov. 5—Meeting jointly in Albany this week, representatives of the Empire State automobile dealers associations and the New York state automobile clubs took definite steps to combat the proposed New York state legislation concerning gasoline taxes and compulsory liability insurance.

The dealers and owners favor a constitutional amendment providing that all fees and taxes derived from the motor vehicle shall go for the construction and maintenance of highways and bridges.

To investigate compulsory insurance and its workings under the Massachusetts law, a committee was appointed consisting of Walter B. Cherry, chairman, Syracuse; John Van Benschoten, Poughkeepsie; Lewis G. Stapley, Albany, representing the Empire State Automobile Merchants Association, Inc.; Owen A. Auspurger of New York City, and John H. Wright of Jamestown, representing the New York State Automobile Association.

Mullins Gets Contract

SALEM, OHIO, Nov. 7—The Mullins Body Corp., which has enjoyed a very substantial expansion in its business and profits this year, is reported to have large orders for 1928. Contract has been closed by the company with a leading motor car company for the latter's entire stamping requirements for 1928. After charges and preferred dividend, Mullins Body is expected to earn this year between $550,000 and $600,000 available for the 100,000 shares of common stock. The plants are now working near capacity.

K.C. Salvage Plant Aids Used Car Sales

Now Handles 85% of Scrapping—Promotes Buying of Better Vehicles

KANSAS CITY, Nov. 7—Kansas City's experiment with a dealer-owned automobile wrecking company is no longer an experiment but has become an integral part of the automotive industry of the city. After almost six months the United Auto Wrecking Co., owned by members of the Kansas City Motor Car Dealers Association, is handling 85 per cent of all the automobile salvage business of the city.

Tom H. Shugrue, manager, says the company has progressed faster than expected and that, in spite of the difficulties encountered by a new organization, it has solved the problem for the dealers of putting the junk cars out of "business."

The company also has purchased the business of the American Auto Wrecking Co. The men employed by the American company, all experienced salvage men, were retained by the United company. The United company now is employing a force of 10 men.

Motor car dealers interested in the experiment are very much pleased with the project. A survey made here indicates dealers have 60 per cent less used cars on hand than this time last year due, they believe, to the fact that their yards and used car show rooms have been cleared of junk cars and that prospects are buying a better used car than before. W. P. Hemphill, vice-president of the dealer association, declares he has already received a 25 per cent "dividend" on his investment in the wrecking company from the better condition brought about in the used car market. At the office of George A. Bond, secretary of the motor car dealers' association, it was stated that virtually every dealer member reported a better used car condition.

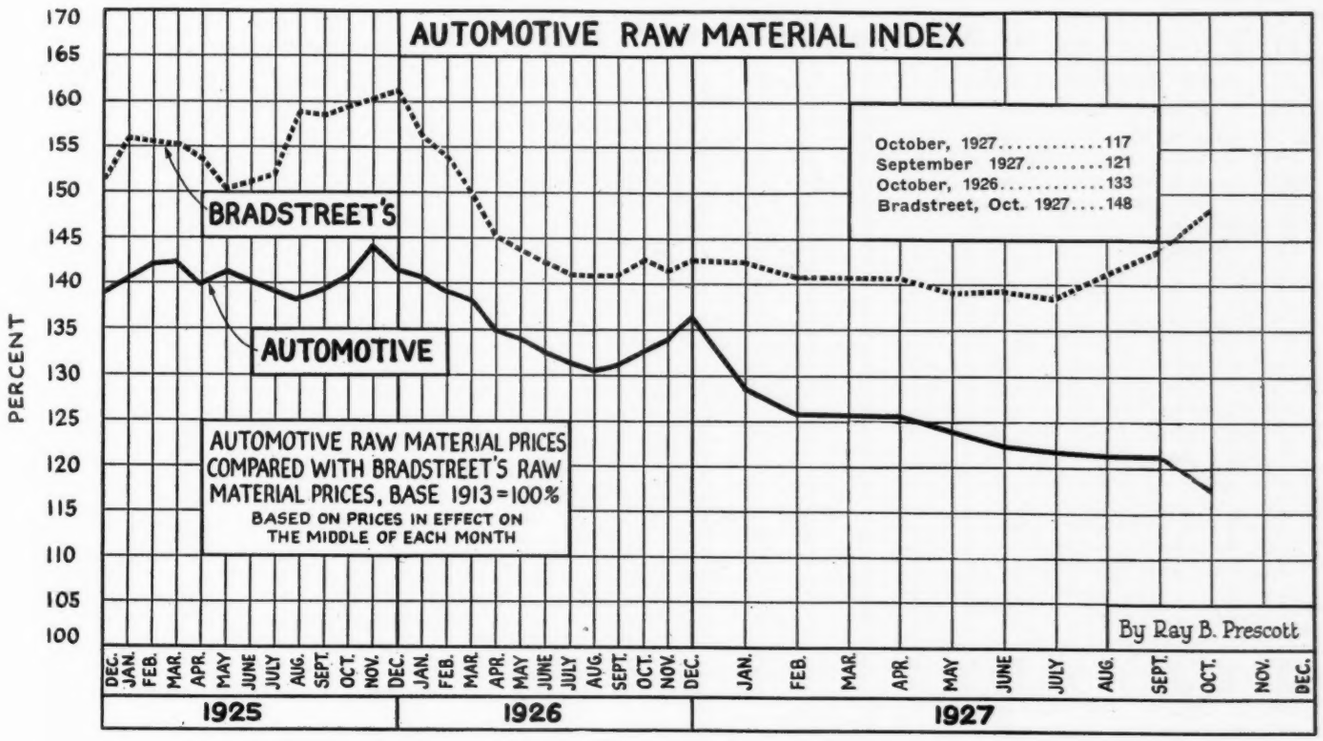
Dealers declare that customers who previously purchased "junk" cars at from $25 to $100 for a few months "transportation" now are buying better used cars—cars that sell from $125 to $150.

The wrecking company has erected a building so that the wrecking may be carried on throughout the winter. A catalog, issued recently, is bringing in much new business on used parts. Shipment of junk metal has been started.

Cleveland Used Car Sales Higher

CLEVELAND, Nov. 7—Used car sales for the first 10 months of 1927 are ahead of the same period last year, figures from the county clerk's office, compiled by the Cleveland Automobile Manufacturers & Dealers Association show. The first 10 months of 1926 showed 104,612 used car sales compared with 105,085 for 1927.

Raw Material Index Drops Four Points



Canadian Exports Gain in September

WASHINGTON, Nov. 9—Automotive exports from Canada in September totaled $1,919,435 and represented an increase of 19 per cent over the exports of August, according to advices received by the automotive division of the U. S. Department of Commerce.

Compared with September of last year, however, the exports show a considerable decline, being 3872 passenger cars and trucks exported in September this year compared with 6471 in September last year. The total production of the Canadian manufacturers for the first nine months of this year aggregated 161,583 and of this total 47,838 cars and trucks were exported. The average value of passenger cars exported in September was $672.

British India, United Kingdom and Australia, in the order named, were the principal markets for Canadian passenger cars during September.

To Give Automotive Course

BOSTON, Nov. 7—Through cooperation between the New England Section of the Society of Automotive Engineers and the Massachusetts Institute of Technology, a course in automotive design and maintenance is to be given at Tech beginning Nov. 29. There will be a series of 10 lectures covering five weeks on Tuesday and Thursday nights limited to a class of 50 and service station men in the various automobile companies are invited to join. Professor Dean Fales will conduct the course. He is widely known in automotive circles both as a member of the S.A.E. and the American Automobile Association contest board technical committee.

Graham Truck Business Reaches 1927 High Mark

DETROIT, Nov. 7—Orders for Graham Brothers trucks and buses in October totaled 6212, establishing a new monthly high for 1927. This was an increase of 11 per cent over September. Capacity operation is continuing. The new ½-ton delivery car is reported enthusiastically received.

The company has started operation of its new plant at Stockton, Cal., and production will be stepped up as rapidly as required. Graham Brothers business has been especially good on the Pacific Coast this year, according to report by Dodge Brothers, Inc.

Gillette Adds 2 Units

EAU CLAIRE, WIS., Nov. 7—To handle increasing business, the Gillette Rubber Co. is working on two factory additions to be in production before the end of the year. One is a 2-story and basement building, 60 x 75 ft., and the other is a third story on a present 2-story factory, 60 x 160 ft.

Indiana Truck Sales Gain

MARION, IND., Nov. 7—Indiana Truck Corp. reports an increase of 35 per cent in third quarter sales, with a 41 per cent gain in September.

Elcar Motor Offers New Eight at $1,395

ELKHART, IND., Nov. 7—Elcar Motor Co. has introduced a new eight-in-line, mounted on a 123-in. chassis, to sell at $1,395, freight, tax and equipment extra. At this price there is offered a five-passenger sedan, a four-passenger coupe, a five-passenger touring and a four-passenger roadster. The cars are to be known as Series 8-78 Standard.

"So far as we know," said F. B. Sears, president, "this is the lowest priced eight-in-line on the market today."

He directed attention to the fact that "equipment extra," as applied to the $1,395 model, means that this line will be minus bumpers, shock absorbers and heater. To provide for those who want an eight-in-line equipped with the accessories named, there will be supplied the same model with bumpers, Lovejoy shock absorbers and a heater, at $1,495. This last-named model will be known as Elcar 8-78 Royal.

Prices for 1928 on other Elcar models are:

	New	Old
8-90 Series		
7-pass. sedan	$2,565	$2,765
4-pass. landau	2,195	2,295
8-82 Series		
5-pass. sedan	$1,895	$1,995
5-pass. brougham	1,895	1,995
5-pass. standard sedan	1,695	1,790
4-pass. standard landau	1,770	1,870
6-70 Series		
5-pass. sedan	$1,295	$1,395
4-pass. landau	1,375	1,475

Men of the Industry and What They Are Doing

H. A. Brown Vice-President of Canadian G.M. Unit

H. A. Brown, comptroller of General Motors of Canada, Ltd., since 1924, has been appointed vice-president and general manager, succeeding Gordon Lefebvre, who recently was named vice-president in charge of operations of Oakland Motor Car Co.

Mr. Brown is one of the youngest executives in General Motors ranks and in the industry, having recently passed his thirty-seventh birthday. He is a native of Pierceton, Ind. He has been active in the work which has brought the Canadian unit of General Motors to the forefront in the past four years and his promotion to the vice-presidency is in recognition of his record.

Schmitt Succeeds Robertson

W. T. Schmitt has been elected secretary-treasurer of the Murray Corp. of America, succeeding F. R. Robertson, resigned. Mr. Schmitt is well known in automotive and financial circles, having been comptroller of the Chrysler Corp. and its predecessor for more than five years. Before his promotion Mr. Schmitt acted as comptroller of the Murray Corporation.

Griffin to Aid Merger

George O. Griffin has resigned as manager of the Federal Motor Truck Co. of California, to devote all his time to the perfection of a merger of three truck-manufacturing concerns on the Pacific Coast. Automotive circles expect that the consummation of this merger will be announced early in November.

Selden Names Poyzer

Glenn W. Poyzer has been appointed transportation engineer of Selden Truck Corp., and in connection with his appointment the company has established a special equipment department which will compile information regarding motor truck transportation and the many special requirements to meet unusual hauling conditions.

Du Pont Makes Changes

W. F. Donohue has been made assistant division manager or the paint, varnish and lead division of the E. I. du Pont de Nemours & Co., A. M. Sullivan has been named sales manager, and W. T. Banning, assistant sales manager of the Philadelphia district, and J. Nelson Werntz has been appointed supervisor of the Pittsburgh district.

K. C. Boosters Name Officers

Automotive Boosters Club, Missouri Valley No. 2, of Kansas City, has elected the following officers:

C. M. Hoffman, president; C. E. Anderson, vice-president; Charles Koslowsky, secretary, and Joseph Sabourin, treasurer.

Alford Sees 1928 as "Year of Plenty"

Indications of a "year of plenty" for 1928 are seen by W. H. Alford, vice-president and comptroller of Nash Motors Co. "The year 1927 is rapidly drawing to a close and manufacturers and business men generally are giving thought to the business outlook for 1928," said Mr. Alford. "In my judgment there is every indication that general business should be as good or better in 1928 than in 1927. I base this conclusion on the general improved condition of our great agricultural population.

"Except for small areas, average crops of corn and wheat have been raised and are bringing good prices. Cattle and hogs are in good condition and are bringing higher prices than they have for several years past."

Elliott Reopens Agency

Harry Elliott has resigned as Pacific Coast manager of the Campbell-Ewald Co. to reopen his own advertising offices in the Monadnock Building in San Francisco under the name of the Harry Elliott Advertising Service. Mr. Elliott has been doing automobile advertising for the past 12 years.

Dickieson With Hershey

E. F. Dickieson, Jr., has been appointed designing and sales engineer of the Hershey Mfg. Co., with headquarters at 2-244 General Motors Bldg., Detroit. Mr. Dickieson was formerly associated with the Morgan Crucible Co. and Gray & Davis.

Multibestos Adds Salesmen

J. W. Broome and W. V. Butler have been appointed representatives of the Multibestos Co., the former in the Indiana territory and the latter in Maryland. Mr. Broome formerly was with Champion Spark Plug Co. and Mr. Butler with the Bell Mfg. Co., Boston.

Spice Joins Chrysler

Charles G. Spice, formerly with the Hyatt, Roller Bearing Co., motor bearings division in the eastern territory, has joined the Chrysler Corp. at Detroit.

Wagner Joins Maffei

R. Wagner has resigned from the board of the Austro-Daimler Motor Co. and is now engaged as sales manager of J. A. Maffei, A.-G., Muenchen, Germany, in the tractor department.

Strong and Churchill Attend Pioneers Meeting

An elaborate program of entertainment was arranged by C. C. Coddington, of Charlotte, president of C. C. Coddington, Inc., Buick distributor for the two Carolinas, as part of the preparations for the second annual meeting of the Buick Pioneers, whose sales this year will aggregate $140,000,000, with E. T. Strong, president of the Buick Motor Co. The Pioneers arranged to devote the entire week of Nov. 7 to their annual meeting, an automobile tour about North Carolina and an outing at Mr. Coddington's country estate on the Atlantic Coast in Onslow County.

Mr. Coddington announced that before the group left North Carolina, he intended that they should "know" this state. C. W. Churchill, general sales manager of the Buick Company, and Lee A. Folger, an executive of Mr. Coddington's organization, also were members of the party.

Selby Rejoins Velie

C. B. Selby, formerly connected with Velie Motors Corp., has been appointed manager of the truck sales division of the company and will be associated with W. L. Velie, vice-president, and F. D. Soper, assistant sales manager, in promoting truck sales and distribution.

McPhail Field Representative

R. G. McPhail, formerly of the Electrical League of Rochester, has joined the staff of the Society for Electrical Development on Nov. 1 as field representative in the league and field department.

Fisher on Bank Board

Fred J. Fisher, vice-president and a director of General Motors Corp., and who in the near future will become a director of Baldwin Locomotive Works, has been elected a director of the National City Bank of New York, the largest financial institution in America.

Brogan Handles Chain Block

G. W. Brogan, Inc., has been retained as advertising counsel by the Ford Chain Block Co., Philadelphia, which was recently acquired by A. P. Van Schaick and W. M. Wheeler, of American Chain Co., Inc.

Agassiz Reelected President

R. L. Agassiz, chairman of the board of the Calumet & Hecla Consolidated Copper Co., has been reelected president of the Copper & Brass Research Association.

Allen Now Vice-President

Victor Allen, sales manager of the Automotive Maintenance Machinery Co., Chicago, for the past three years, has been appointed vice-president in charge of sales.

Industry Forces Join in Tax Repeal Fight

Representatives of Dealer, Owner and Parts Associations Back N.A.C.C. Plea

WASHINGTON, Nov. 7—Complete and final repeal of the remaining 3 per cent excise taxes on automobiles was urged today on the House Way and Means Committee by representatives of seven national organizations, one member of Congress and Governor Fred W. Green of Michigan.

The lead in the fight was made by George M. Graham, of the tax committee of the National Automobile Chamber of Commerce and executive assistant to the president of the Willys-Overland Co. Mr. Graham expressed the views of the automobile manufacturing industry and urged the committee to "end the war for the motorist as it has already been ended for other groups."

The National Automobile Dealers' Association's views were outlined by Warren E. Griffith, speaking for the 52,000 dealers. He pointed out that the dealer is a large loser in the tax program as he must pay the tax—and lose the sum paid—on demonstrator cars, on repossessed cars and frequently on time sales. He characterized the tax as difficult to collect and an unwarranted imposition on the dealer.

Shelby M. Jett, secretary of the B. F. Goodrich Rubber Co., speaking for the Rubber Association of America, Inc., pointed out to the committee, that despite the fact that the last Congress ordered the repeal of the tax on tires and tubes, that nevertheless the tax must still be paid on 30 per cent of all tires and tubes sold. This is explained by the fact that 30 per cent of all tires and tubes are sold to the automobile manufacturer for car equipment.

Tax Paid Totals $1,068,000,000

Speaking for the 943 motor clubs, affiliated with the American Automobile Association, having a membership of 1,000,000 automobiles, Thomas P. Henry of Detroit, president of the association, characterized as "untenable" the secretary's declaration that automobiles are not sufficiently taxed to pay for Federal-Aid for highways, pointing out that the tax already has yielded the Federal Government $1,068,000,000.

In addition to the views expressed by Mr. Griffith in behalf of the National Automobile Dealers Association, the following also appeared before the committee: C. E. Gambill, of Chicago; J. W. Tarbill, Cincinnati; Harter B. Hull, Baltimore; C. E. Fisher, Newark, N. J.; C. A. Vane of Chicago, and Stanley Horner of Washington, D. C.

Representing the N. A. C. C. in addition to Mr. Graham, were H. H. Rice, chairman of the chamber's taxation committee; F. A. Morrison, secretary of the Chrysler Corp.; H. L. Moekle, of Ford Motor Co.; Alfred Reeves, general manager; Robert A. Brannigan, patent counsel, and C. A. Armstrong.

Representatives of the Motor and Accessory Manufacturers, the Automotive Equipment Association, and the National Association of Taxicab Owners also expressed views.

Rep. Grant M. Hudson, of Michigan, declared to the committee that the tax was discriminatory and a great burden on a great industry in his state, that it was without justification and should have been repealed as a war-emergency measure years ago.

Governor Fred W. Green of Michigan, expressed similar views and added that the taxation of motorists should not be indulged in by the Federal government but was a matter for proper administration by the respective states.

The views of Henry and Edsel B. Ford, were expressed to the committee in the form of a letter from the Ford Motor Co. to H. H. Rice, chairman of the N. A. C. C. taxation committee.

Army Trucks to Cut P.O. Christmas Costs

WASHINGTON, Nov. 9—To expedite the handling of Christmas mails, the War Department has ordered that all available motor vehicles not actually needed for military purposes be placed at once at the disposal of the Post Office Department. The actual expense of operating the cars is to be borne by the P. O. Department. The articles are later to be returned to the control of the Army.

Heretofore it has been the practice of the P. O. Department to employ in large cities a large fleet of outside motor equipment in order to handle the Christmas rush of mails and it is estimated by the government's coordinators that this use of War Department trucks will mean a saving of more than $2,000,000 to the government.

National Standard Parts Adds 11 Manufacturers

DETROIT, Nov. 7—National Standard Parts Association has admitted 11 more manufacturers to membership. They are AC Spark Plug Co., Brown Lipe Gear Co., Champion Spark Plug Co., Hutto Engineering Co., Inc., Detroit; Van Dorn Electric Tool Co., Cleveland; World Bestos Corp., Paterson, N. J.; Alvord Polk Tool Co., Millersburg, Pa.; Chicago Rivet & Machine Co., Millersburg Reamer & Tool Co., Millersburg, Pa:; Watkins Mfg. Co., Wichita, Kan., and Cleveland Worm & Gear Co., Cleveland.

New England Flood Leaves Industry Safe

Damage to Automotive Plants Slight—Much Replacement Work Expected

SPRINGFIELD, MASS., Nov. 9—With the flood waters of the Connecticut River now definitely subsiding after their greatest rampage of the past 73 years, the industrial district affected by high water is rapidly making headway toward resumption of normal operations.

Automotive industries, sales establishments and garages in this district were comparatively fortunate as regards losses from the flood that overwhelmed many communities in western New England. Few concerns were so located as to suffer serious damages to cars or equipment. Several showrooms near by were flooded and some filling stations were completely washed away by the rush of waters. Many cars were ruined and the outlays for new equipment and repairs for cars and trucks will be heavy on the part of fleet owners and others.

The Wiley & Russell plant of the Greenfield Tap & Die Corp. suffered considerable damage and was obliged to shut down. Gilbert & Barker Mfg. Co., makers of gasoline pumps in West Springfield, also was forced to close, as was the Perkins Machine & Gear Co. of the same town. Interruptions were only brief, however.

Dealers Remove Stocks

HARTFORD, CONN., Nov. 9—Losses by flood to many automobile, parts and tires dealers in this section were avoided by the removal of stocks to higher ground. Similar action in many other sections visited by the flood has held losses to a minimum. Large stocks of gasoline were washed away here and at other points. A considerable volume of work, however, will have to be done in restoring salesrooms and service stations and this loss will fall upon dealers.

Much loss was occasioned to private owners of cars. Many cars were washed away or buried throughout New England and hundreds of others were severely damaged. The replacement and repair of these will bring much automotive activity as soon as normal conditions are restored.

Harvey R. Nason

TRENTON, N. J., Nov. 7—Harvey R. Nason, secretary of the Murray Rubber Co., died suddenly Nov. 5 while returning to his home here in an automobile from the football game in Princeton. Mr. Nason was taken to the Mercer Hospital, Trenton, where he was pronounced dead. He was 56 years old and had been connected with the Murray company for a number of years.

Morris Now Building 60,000 Cars a Year

Department of Commerce Gets Special Report on Henry Ford of Europe

WASHINGTON, Nov. 8—The phenomenal rise of W. R. Morris, the "Henry Ford" of England, has been made the basis of a special report to the automotive division of the U. S. Department of Commerce by Trade Commissioner W. M. Park at London.

He is the head of the Morris Motors, Ltd., Morris Engines, Ltd., and the Morris Commercial Cars, Ltd., the three having a capitalization of $15,000,000. From an output of 357 cars in 1919, his companies now produce approximately 60,000 vehicles a year, being almost one-half of the 62 British motor car manufacturers production which in 1926 totaled 158,000 passenger cars.

Like his American prototype the English car builder is a believer that the public wants a cheap price car and that this can only be done by mass production. Prices on the 11.9 hp. Morris-Crowley range from $693 to $742. His companies pay the highest wage scale of any English car manufacturer. In addition to the 11.9 hp. Morris-Crowley, the company builds a 14.26 and a 15.9 hp. car.

Morris dealers are located in all the principal cities and towns and in most of the villages of England. Advertising is done on a national scale. Portable garages built especially to fit Morris cars, financing of instalment purchases on easy payment terms and free insurance for the first year are some of the factors in his sales successes.

The English "Henry Ford" is now in his early forties, was born in Worcester and lived most of his life at Oxford. He worked as a bicycle mechanic where he first became interested in mechanical propulsion. He personally built his first motorcycle engine. With the introduction of automobiles he founded a garage in Oxford and with the profits saved—again like Ford—made his first engine in his own garage and laid the foundation of the present Morris undertakings.

Reo Shipments in 1927 to Exceed 45,000 Mark

LANSING, Nov. 5—With shipments aggregating 4604 cars and Speedwagons, October was the third largest month in the history of the Reo Motor Car Co. The shipment of 4604 units compared with 1937 in October, 1926, an increase of 137 per cent. This increase was participated in by both passenger car and Speedwagon divisions, passenger car shipments increasing from 432 to 2477 and Speedwagons from 1505 to 2127. Indications now are that shipments for the calendar year will exceed by a substantial margin, the mark of 45,000 which was recently predicted.

German Industry Issues Booklet

BERLIN, Oct. 31 (*by mail*) —The first attempt at issuing a comprehensive survey of the German automobile and associate industries has just been made by the Association of German Automobile Makers in the form of a booklet in name and contents similar to the Facts and Figures of the American National Automobile Chamber of Commerce. It comprises data up to the middle of 1926 and partly also to the end of that year and is an interesting and valuable publication. Copies can be obtained for 1 mark including postage from the Reichsverband der Automobilindustrie, Berlin W.8.

British Car Makers Plan Export Drive

WASHINGTON, Nov. 9—A movement to secure a greater proportion of the world automotive export trade has been initiated by automobile manufacturers of England, according to advices received by the U. S. Department of Commerce. The initial step is to be taken by the Central Association of Motor Manufacturers Association & Traders, who will call a meeting the first of the year with representatives of the export credit section of the manufacturers' department of overseas trade in order to discuss possible development of systems of credit in connection with the export motor car business.

The official view in London of the motor car manufacturers is that although since the reimposition of the McKenna duties on imported motor vehicles, British manufacturers have been kept well employed in supplying the home trade, the time has now come when greater attention must be devoted to the foreign markets, the department is advised.

Acklin Opens Office

DETROIT, Nov. 7—Acklin Stamping Co., Toledo, has opened a sales office here at 3-239 General Motors Bldg., with Harold Jay as district manager. This office will maintain contact with all customers in Michigan. Mr. Jay has been connected with the company's central office for eight years.

Parker-Kalon Moves

NEW YORK, Nov. 7—The Parker-Kalon Corp., manufacturer of hardware and sheet metal workers' specialties, has removed to 200 Varick St., where it will have 55,000 sq. ft. of floor space for large scale and economical manufacture of its products.

2,000,000th Dodge Rolls from the Line

Company's First Car Built in November, 1913 — Car Ordered 8 Years Ago

DETROIT, Nov. 5—Dodge Brothers, Inc., today celebrated the production of the 2,000,000th Dodge Brothers car. As the car rolled from the production line, Al Livermore, the oldest employee in point of service, with a record of 37 years continuous employment, took the wheel, and, with the next three oldest employees, Bill Wohlfeil, Al Aldrich and Otto Graul, as passengers, drove to the shipping platform where they were greeted by President E. G. Wilmer, Vice-Presidents A. Z. Mitchell, H. H. Springford and A. T. Waterfall and other company executives.

The car will be shipped to W. L. Eaton, Seattle dealer, who put in his order for the 2,000,000th Dodge Brothers automobile eight years ago, when he found his order for the 500,000th was six months late.

The first Dodge Brothers car was turned out by the late John and Horace Dodge Nov. 14, 1914. In commenting on the occasion, Mr. Wilmer cited that Dodge Brothers in less than 13 years, have produced products whose retail volume is estimated at $2,200,000,000, a sum said to be greater than the entire amount of capital invested in automobile manufacturing plants in the United States. He also stated that during that period Dodge Brothers have paid their employees $345,000,000 in salaries.

New Dodge Dealer Leases 13 New York Properties

NEW YORK, Nov. 7—Bishop, McCormick & Bishop of Brooklyn, who have taken over the sales and servicing of Dodge cars in Manhattan, the Bronx and Westchester County, with the Bismac Corp., also of Brooklyn, have closed 13 leases of properties in their new field. The leases include the Broadway corner store of the Fisk Building, 50 x 85, for main display rooms. In the building adjoining on the south, they have taken the store and basement formerly occupied by C. H. Jennings, Inc., together with the second and third floors, which comprise 10,000 sq. ft. each.

Coast Assembly Larger

OAKLAND, Cal., Nov. 7—The Chevrolet plant in this city is now the largest automobile factory west of the Rocky Mountains, according to J. G. Eggert, production manager. When the factory was established in 1916, production was 75 cars a day. It is now 500 cars daily and production is being increased. More than 15,000 persons visited the factory in two days of open house at the end of October.

Exports, Imports and Reimports of the Automotive Industry for September of Current Year and Total for Eight Months Ending September, 1927

	Month of September				Nine Months Ending September			
	1926		1927		1926		1927	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	..	$26,800,505	..	$28,044,137	..	$245,826,352	..	$302,973,102
Electric trucks and passenger cars	6	8,923	6	12,701	63	103,509	86	164,410
Motor trucks and buses (total)	6,963	4,671,705	7,240	5,286,757	51,568	36,259,377	79,959	51,872,400
Up to 1 ton, inclusive	5,493	2,541,555	5,209	2,584,511	40,728	19,021,676	65,526	30,555,512
Over 1 and up to 2½ tons	1,243	1,515,424	1,877	2,270,299	9,137	12,002,119	12,613	15,977,528
Over 2½ tons	227	614,726	154	431,947	1,703	5,235,582	1,820	5,339,360
PASSENGER CARS								
Passenger cars, except electric (total)	20,038	14,952,464	19,033	14,528,351	179,679	132,433,107	221,506	162,423,002
Value up to $500, inclusive	8,228	3,268,786	3,445	1,388,776	73,043	27,959,948	51,965	19,338,236
Value over $500 up to $800	5,802	4,078,230	5,966	3,165,332	51,408	35,088,464	75,402	41,991,964
Value over $800 up to $1,200	4,597	4,829,511	6,348	5,320,523	42,203	44,450,755	62,864	54,246,334
Value over $1,200 up to $2,000	905	1,393,211	2,607	3,144,685	8,858	13,576,300	24,473	30,558,855
Value over $2,000	506	1,382,726	667	1,509,035	4,167	11,357,640	6,802	16,287,613
PARTS								
Parts, except engines and tires	..	..	..	..	..	..	..	..
Automobile unit assemblies	..	2,351,141	..	2,874,631	..	31,906,522	..	35,102,931
Automobile parts for replacement	..	3,177,107	..	4,166,417	..	27,031,740	..	37,750,655
Automobile accessories	..	745,100	..	461,563	..	7,307,864	..	6,131,716
Automobile service appliances (n. e. s.)	..	653,820	..	459,636	..	5,493,537	..	6,102,779
Station and warehouse motor trucks	8	10,671	18	17,538	124	131,959	214	155,874
Trailers	78	22,019	103	48,614	784	277,319	738	339,540
Airplanes, seaplanes and other air craft	2	9,083	1	6,000	32	149,204	28	389,417
Parts of airplanes, except engines and tires	..	5,164	..	51,817	..	116,950	..	389,566
BICYCLES, ETC.								
Bicycles	357	9,201	331	9,242	4,123	121,117	3,567	98,272
Motorcycles	1,633	362,544	1,188	270,540	17,501	3,792,011	14,430	3,230,881
Parts and accessories, except tires	..	97,337	..	84,614	..	1,358,049	..	951,351
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	98	102,571	26	40,293	668	1,226,590	546	910,290
Other stationary and portable:								
Not over 10 Hp.	3,936	347,709	3,193	258.572	26,040	2,526,051	21,978	1,946,743
Over 10 Hp.	561	265,915	440	153,759	2,305	2,048,291	2,137	1,334,835
Automobile engines for:								
Motor trucks and buses	526	61,212	290	40,429	3,055	444,907	4,379	525,837
Passenger cars	5,856	832,853	5,171	673,288	102,972	10,339,326	82,826	9,002,151
Tractors	409	217,785	95	22,817	1,725	954,606	1,028	420,937
Aircraft	12	5,656	5	28,784	289	567,859	76	318,058
Accessories	..	204,339	..	167,740	..	1,715,700	..	1,763,839
IMPORTS								
Automobiles, including chassis (dutiable)	87	157,609	71	132,493	548	987,718	455	825,090
Other vehicles and parts for them (dutiable)	..	21,459	..	35,695	..	116,547	..	177,492
REIMPORTS								
Automobiles (free from duty)	24	29,519	11	15,201	134	199,667	144	213,372

September Exports 10.2% of Production

WASHINGTON, Nov. 9—Automotive exports from the United States during the month of September totaled $29,129,619, an increase of approximately $1,000,000 over the September exports of 1926, according to figures announced this week by the automotive division of the U. S. Department of Commerce. The average monthly automotive exports for this year totaled $35,202,834, the department announces.

The September exports totaled 26,273 units, of which 19,033 were passenger cars and 7240 were trucks. Revised figures of the department show that the passenger car production during September was 225,013 and of this number 8.5 per cent of the total passenger car production was exported. The September truck production was 32,564 of which 22.2 per cent was exported. Comparing the exports with the total production in September the figures show that 10.2 per cent of the total production was sold abroad. In September, 1926, the export business amounted to 6.9 per cent of the total production amounting to 393,357 cars and trucks manufactured, of which 27,001 were exported.

8.8% for First 9 Months

The revised production figures for the nine months of this year show that the domestic manufacturers have produced 2,851,736 cars and trucks. Of this number 2,509,018 passenger cars were produced, of which 8.8 per cent was exported. The truck production the first nine months of this year totaled 342,718 and of this production 23.3 per cent was exported.

Europe Too Satisfied is Kettering Opinion

NEW YORK, Nov. 7—Charles F. Kettering, vice-president and head of research of General Motors Corp., who returned from Europe last week, spoke optimistically of the development of substitutes for gasoline, saying that there was no possibility of exhausting the fuel supply for motor car use. General Motors is not concerned over the sort of fuel to be used, he declared, but is concentrating on methods of getting more power out of fuel.

The trouble with Europe is "the horse-and-buggy idea," declared Mr. Kettering. Europeans don't have anything because they don't want anything.

"I told a member of the British Government that if he wanted to get rid of the dole the way to do it would be to start manufacturing things that are ordinarily called luxuries. Then every one would get busy making these things, buying these things, and there would be prosperity again."

World Bestos Expands

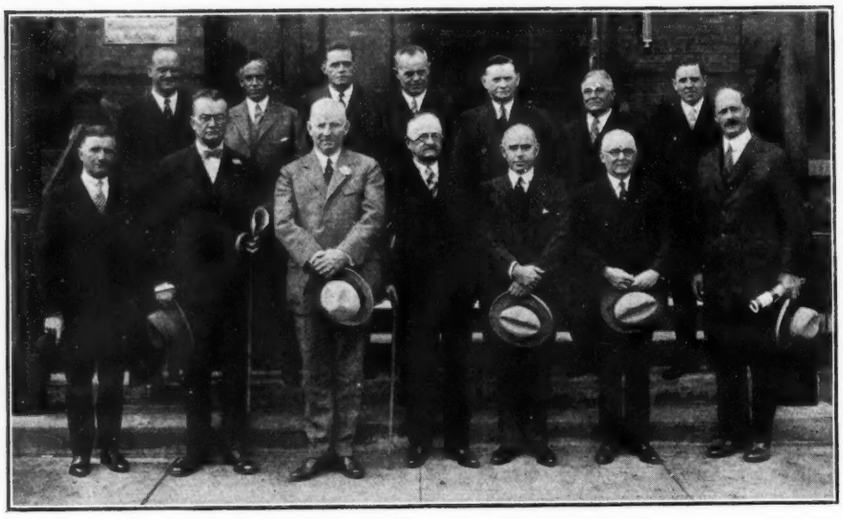
PATERSON, N. J., Nov. 5—World Bestos Corp., manufacturer of brake lining, reports sales in the first three quarters of 1927 as 200 per cent larger than the same period in 1926. Additional factory space has been acquired.

French Fuel Imports 2,028,284 Tons in 1926

PARIS, Oct. 28—France imported 2,028,284 tons of refined gasoline, lubricating oils and crude oils, during 1926, this representing an increase of 30 per cent compared with the year 1924. During the same period the number of automobiles increased 41 per cent. In addition to the imported fuel, France produced 150,981 tons of home produced fuel, this comprising petrol from the Pechelbronne and Gabien wells, 60,000 tons of benzol and 22,684 tons of alcohol.

In view of the impossibility of producing more than a minute quantity of gasoline in the home territory, the French policy, declares M. Pineau, head of the National Office of Liquid Fuels, in his official report, is to secure interests in foreign oil fields.

The national office has subventioned various scientific organizations working on the problem of fuel economy. Most important of these is the laboratory at Bellevue, near Paris, on which 5,000,000 francs have been spent and which, at the end of the present year, will be the most elaborate engine test laboratory in the world. Encouragement has been given to boring operations in various parts of France, the number of boring permits having increased from 15 in February, 1925, to 65 in May, 1927, and the funds devoted to this work amounting to 6,300,000 francs for the year 1927.



Studebaker's Board of Directors

Front row—J. M. Studebaker, Jr., John F. Harris, A. R. Erskine, Frederick S. Fish, Herbert H. Lehman, C. L. Bockus, James H. Perkins. Second row—H. S. Vance, Waddill Catchings, F. Studebaker Fish, Elmer T. Stevens, Edward N. Hurley, Frederick W. Longfellow, Paul G. Hoffman. Mr. Perkins, president of the Farmers Loan & Trust Co., New York, was elected to the board, Oct. 31, to succeed N. R. Feltes, of South Bend

White Changes Wait Return of President

CLEVELAND, Nov. 9—With the return next week of Walter C. White, president of the White Co., from an eastern business trip, important changes in plant officials are expected to be made, these following resignations of Windsor T. White, as chairman of the board, and Thomas H. White, as vice-president and general manager at last week's board meeting. Both men continue as directors.

Thomas H. White, who took over the general manager post in 1924, is credited with the expansion program which the company has pursued since then. The failure of earnings to keep pace with increased business, dwindling to $2,183,567 in 1926 as compared with sales of $64,578,088, is held mainly responsible for the changes now under way.

Walter C. White, who relinquished much of his activity in company affairs in 1924, is again assuming active direction of affairs, and it is expected that a new program will be initiated under his management.

Niles Plants Active

NILES, OHIO, Nov. 7—From at least five sources, industrial improvement, all contingent on automotive activity, is indicated from Niles and district. After being idle a year the Youngstown Steel Car Works resumed the past week. Niles sheet steel plants making automotive steel are operating 40 of 51 units, an increase of two over the week before. The American tube & Pipe Bending Co., at Mineral Ridge, which closed down last June, is working under the name of the American Tube Bending Co.

Having been idle since 1926, the Ridge Cast Products Co. is once more working in full, with business increasing monthly.

Dodge Brothers Offers Prize for Best Letters

DETROIT, Nov. 8—Dodge Brothers, Inc., is offering a cash prize of $500 each month to the writer of the best letter on "Why I Own a Dodge or Why I Want a Dodge." The competition is in conjunction with the broadcasting of the Dodge radio hour each week. The letters are to be written on special blanks obtained from dealers and are mailed to the radio committee at the Dodge Brothers factory here. The best letter received each week is to be read during the broadcast and the winner each month will be picked from those read.

Gates Pays Bonus

DENVER, Nov. 7—Gates Rubber Co. employees entitled to full participation under the profit sharing plan, received dividend checks Nov. 1 amounting to 8.36 per cent on salaries for the past quarter. The Gates bonus plan provides that no prior deduction for use of invested capital is made before figuring the dividend. Under the plan of Charles C. Gates, president, the capital represented by the efforts and intelligence of the personnel should share earnings with the invested capital.

Petroleum Institute Program Out

NEW YORK, Nov. 7—The American Petroleum Institute has issued a preliminary program of its eighth annual meeting, to be held Dec. 5 to 8 at the Stevens Hotel, Chicago.

Financial Notes

United States Rubber Company's net income for the 10 months ended Oct. 31, 1927, amounted to approximately $5,100,000 after taxes and charges, compared with $7,300,000 in the corresponding 1926 period, a decrease of $2,200,000. Allowing for 10 months' dividend requirements on the 651,100 shares of 8 per cent preferred, net was equal to 93 cents a share on the $10,000 shares of common stock outstanding while earnings in the same months of 1926 equaled $3.65 a common share. Gross sales in the first ten months of 1927 were about $177,000,000, a decrease of some $19,000,000, or 10 per cent, under last year, while sales of tires alone totaled approximately $40,500,000, a decrease of $18,000,000. As of Oct. 31, bank loans amounted to $20,800,000 as compared with $17,550,000 on June 30.

Pierce-Arrow Motor Car Co. for the quarter ended Sept. 30, 1927, showed net loss of $373,999 after interest, depreciation, taxes, etc. This compared with net income of $17,609, equivalent to 71 cents a share earned on 100,000 shares of 8 per cent cumulative stock in the preceding quarter and $176,246, or $1.76 a share on the 8 per cent preferred in the third quarter of 1926. Net loss for the nine months ended Sept. 30, 1927, totaled $258,616 after the above charges. This compared with net income of $980,090 in the first nine months of 1926, equal to $9.80 a share on the 8 per cent preferred and $1.15 a share on 328,750 shares of common after allowing for only regular dividend requirements on the 8 per cent preferred shares.

Curtiss Aeroplane & Motor Co., Inc., reports a net income of $216,819 for the September quarter, against $85,368 in the third quarter of 1926. These earnings are after interest but before Federal taxes and equal $2.46 a share earned on $2,523,100 of 7 per cent cumulative participating preferred, and 71 cents a share on the common stock, against $1.92 and 17 cents, respectively a year ago. Sales totaled $1,379,007 against $828,689. The net profit for the first nine months of the year was $549,071, before taxes, or $6.96 on the preferred, and $1.71 on the common stock, against $206,112, or $5.55 on the preferred and 30 cents on the common in the like period of 1926.

Chandler-Cleveland Motors Corp. for the quarter ended Sept. 30, showing a net profit of $170,164 after depreciation, Federal taxes, etc., equivalent to 48 cents a share earned on 350,000 no par shares of $4 preference stock. This compared with $411,606, equal after preference dividend requirements to 22 cents a share on 280,000 no par common shares, in the preceding quarter, and $381,512, or 11 cents a share, on common in the third quarter of 1926.

Murray Corp. of America and subsidiaries report for the first nine months of 1927 net profit of $311,342 after expenses, depreciation and other charges, but before Federal taxes.

Lee Rubber & Tire Co. reports for the 10 months ended Oct. 31, net profit of $700,000 after all charges, equal to $2.33 a share earned on 300,000 capital shares.

October Rim Output Drops to 1,384,924

First Ten Months' Production Totals 18,039,045 Against 21,866,058 in 1926

CLEVELAND, Nov. 7—Rim production in October totaled 1,384,924 as against 1,828,539 in October last year, according to the report of the Tire & Rim Association of America, Inc. For the 10 months of 1927 production totaled 18,039,045 as against 21,866,058.

Production of balloon rims in the 18 in., 19 in., and 20 in. sizes showed increases for the month and in the 18 in. and 19 in. sizes were far ahead of the former year. Production of 20 in. truck sizes were also far ahead of both October last year and the first 10 months of 1926.

Comparison of October production in the leading sizes follows:

Clinchers	1927	1926
30x3½	155,219	162,288
18" Balloon		
26x4	54,655	36,677
19" Balloon		
26x3½	32,894	.....
27x4	99,108	1,250
28x4½	21,978	.....
20" Balloon		
27x3½	57,077	.....
28x4	121,385	208,907
29x4½	14,203	16,794
30x5	38,648	12,693
21" Balloon		
28x3½	366,222	814,313
29x4	87,135	154,983
30x4½	72,828	112,622
High Pressure		
30x3½	6,858	29,325
32x4½	17,419	37,430
32x4	13,761	15,305
20" Truck		
30x5	125,644	119,312
32x6	32,407	18,454

New Whippet Cabriolets Priced $745 and $875

TOLEDO, Nov. 10—Willys-Overland, Inc., has added two convertible cabriolet coupe models to supplement the present line of four and six-cylinder Whippet models. The new models are priced at $745 and $875, respectively. The tops are of full folding type. The side windows are set in nickeled frames, permitting the windows to be raised when the top is down. Front and rear compartments are upholstered in leather. Aluminum steps are fitted on the rear right fender to permit easy access to the rumble seat. The cars are finished in two-tone combinations.

Franklin Behind Orders

SYRACUSE, Nov. 9—The plant of the H. H. Franklin Mfg. Co., has been operating at normal capacity since the new series of "Airman" cars were placed on the market. Orders from dealers are running slightly ahead of shipments. Indications are that the factory, employing around 2500 people, will continue on the present basis for the balance of the year.

Propose Federal Aid 2 Years in Advance

WASHINGTON, Nov. 9—A bill which would authorize Congress to make its appropriations for Federal Aid two years in advance, instead of one, will be introduced in Congress at the forthcoming session by Senator McNary of Oregon, he announced this week. Under the present Federal Aid program Congress has been appropriating $75,000,000 for regular highway work each year. These appropriations, however, are made only one year in advance and it is upon the recommendations of the American Association of State Highway Officials that Congress should make its annual appropriations well in advance so that the Bureau of Public Roads and state highway departments may outline their projects for the years to come.

Nash Export Business Sets New Month Mark

KENOSHA, Nov. 7—October was the biggest export month in the history of Nash Motors Co., according to C. W. Nash, president. Shipments for export last month were 82 per cent above those of October, 1926.

"During October, Nash export shipments exceeded by over 38 per cent overseas shipments for the entire calendar year 1922," said H. M. Salisbury, export sales manager. "For the initial 11 months of the 1927 fiscal year, Nash export shipments exceeded by 24 2/3 per cent Nash overseas shipments for the entire preceding fiscal year. Our export shipments of Nash cars for the 1927 fiscal year will exceed those for the combined fiscal years 1922, 1923, 1924 and 1925."

General Chromium Opens Plant in New York City

NEW YORK, Nov. 7—National Chromium Corp. has established a modern chromium plating plant at 200 Varick St. to serve the eastern territory. The plant offers a complete chromium plating service, beginning with a staff of engineers for research work and ending with large production facilities for output of articles adaptable for chromium plating. The plant contains 35,000 sq. ft. of floor space and additional space is available for expansion.

To Make Kulp Bulbs

CHICAGO, Nov. 7—A contract has been signed between General Electric Co. and the Kulp Theft Proof Lamp Co., this city, for the manufacture in volume of Kulp light bulbs.

More Buyers Enter Market for Steel

Upturn in Aggregate Consumption Seen Though Individual Orders Are Small

NEW YORK, Nov. 10—Hand-to-mouth buying continues to restrict automotive demand to relatively light tonnages, but most market observers admit that the number of buyers in the market is on the increase and that this portends a slow but certain upturn in aggregate consumption. Parts makers have been buying more freely, especially blue annealed sheets for stamping stock. Mills have been so eager for this business that buyers had no trouble in securing even moderate-sized tonnages at 2.10 cents, Pittsburgh.

Most of the black sheet business appears to carry a 2.90 cents price, although 2.85 cents, Pittsburgh, is reported to be quoted by some sellers. Full-finished automobile sheets hold steady at 4.15 cents, Pittsburgh. The market for both hot and cold-rolled strip steel is very ragged.

Some irregularities are also noted in the market for steel bars which continue to be quoted nominally at 1.75 cents, but some business seems to have been transacted at $1 a ton under that level. Cold-finished steel bars, light as the demand for these is at the present, appear to be holding their own at 2.20 cents, Pittsburgh, in small tonnages, and 2.10 cents, Pittsburgh, in round lots. Automotive alloy steels continue in routine demand at unchanged prices.

While finished steel prices have been giving way all along the line in the last few weeks, those for semi-finished steel hold steady. Non-integrated sheet rollers and strip steel producers have followed the example of their own customers and bought material only as they needed it. In some quarters it is hinted that semi-finished steel buyers refrained from bringing pressure to bear on prices chiefly because they recognize that if they succeeded in doing so their competitors might obtain even lower prices.

Pig Iron—The market continues sluggish. Sacrifice prices quoted by some Middle West blast furnace interests on both foundry and malleable have induced some business, but the market on the whole, although obviously advantageous to melters, fails to interest automotive consumers beyond routine requirements.

Aluminum—There has been no very active response on the part of automotive consumers to offerings in the "outside" market at approximately ¾ cent per pound under the sole domestic producer's price. Remelted metal is offered at as low as 22 cents for 98 @ 99 per cent pure, about 2 1/3 cents under the price for virgin metal quoted by resellers.

Copper—Domestic demand continues to lag, but foreign buying has brought about a fractional price advance.

Lead—Storage battery manufacturers show more interest in offerings.

Olympia Attendance 3547 More Than 1926

LONDON, Oct. 25 *(by mail)*—The paying attendance at the Olympia Show this year was 275,222, which includes 7227 on the extra day, when 10 shillings was charged for admission, the other eight days being equally divided between five shillings and half-crown (two shillings and sixpence) days. Even after deducting the attendance on the extra day (which was devoted to a press and dealers' view in previous years), the attendance was 3547 higher than last year, and nearly 80,000 more than in 1925. Despite the bigger total this year, however, there were three days on which the attendance was lower than last year, viz.: The Wednesday and the second Friday and Saturday, as shown in the following table giving the comparative figures for 1924-1927:

	1924	1925	1926	1927
Thursday ...	(No previous opening)			7,227
Friday	16,093	16,409	21,845	27,767
Saturday	26,756	28,431	43,407	45,940
Monday	17,728	19,267	25,708	26,195
Tuesday	19,347	20,920	27,494	28,210
Wednesday ...	24,220	26,525	37,070	35,887
Thursday	20,802	22,698	30,458	32,765
Friday	31,041	31,433	40,251	37,468
Saturday	24,589	28,376	38,212	33,763
Totals..	180,576	194,059	264,445	275,222

Zinke Gets Baird Line

CHICAGO, Nov. 5—The Zinke Co. has completed arrangements for taking over the national sale of the Baird Lock Co. line of locks for spare tires, wheels and rim locks. The Baird company, which has been making locks in other lines for years, has recently developed an automotive lock line priced at from $3.50 to $6. Specially built transmission locks for certain cars are included. Distribution will be through jobbers.

Coming Feature Issues of Chilton Class Journal Publications

Feb. 18—Statistical Issue—Automotive Industries

Jan. 1—National Shows Number—Automobile Trade Journal.

Jan. 5—National Shows Issue—Motor Age.

Belgian Registrations Show Increase to 92,192

WASHINGTON, Nov. 9—An increase of 344 per cent in the motor vehicle registration figures in Belgium during the past six years is reported to the U. S. Department of Commerce by the American consul at Antwerp. Registrations for 1921 totaled 20,756. In 1927 the total registration for the first nine months totaled 92,192.

The greatest increase occurred in light trucks which numbered 2257 in 1921 and 25,901 in 1927. Passenger cars rose from 14,999 to 59,108, or an increase over the six-year period of 294 per cent. Of the total increase the American share was 30 per cent.

S. P. Seeks New Bus Lines

SACRAMENTO, CAL., Nov. 5—The Southern Pacific Motor Transport Co., a subsidiary of the railroad of the same name, hs filed application for permission to operate two more bus lines in California, in addition to the one it is now operating between Boulder Creek and Felton, in the Santa Cruz Mountains. The proposed lines will operate between Santa Cruz and Watsonville, south of San Francisco, and between Crockett and Vallejo, to the north.

London-Paris Planes Reduce Winter Rates

LONDON, Oct. 26 *(by mail)*—Second-class fares will be introduced next week on the London-Paris service of Imperial Airways and at the same time the standard or first-class rates will be reduced. This innovation in air travel is due to a desire to maintain traffic receipts during the winter months. Second-class fares will apply only to the 8 a. m. outward and 11.35 a. m. inward service, the noon outward and inward from Paris at 10.45 a. m. being reserved for first-class.

The new rates are as follows: First class £4. 15s., single; £9. return (old winter rates £5. 5s. and £10. Second class, single £3. 15s.; return £7. 10s.

It is of interest to note that while it will now be possible to travel by air to Paris for £3. 15s., in 1919 the cost was £21, and in 1920, £10. 10s. In March, 1921, the single fare was reduced to £6. 6s., at which level it has remained ever since, except for a temporary reduction each winter to £5. 5s.

Apart for the early service only being available, second-class passengers will suffer no inconvenience; there is no question of inferior aircraft being used, or a reduced standard of safety or reliability being imposed.

Hughes Heads Delegates

WASHINGTON, Nov. 5—The delegates to the Pan-American Conference to be held at Havana, Cuba, on Jan. 16, 1928, were announced this week at the White House. The delegation will be headed by Charles E. Hughes and includes Henry P. Fletcher, Oscar Underwood, Dwight W. Morrow, Morgan J. O'Brien, James Brown Scott, Ray Lyman Wilbur and Dr. Leo S. Rowe. International law, commerce, aviation and highway plans are to be discussed.

Calendar of Coming Events

SHOWS

All Western Road Show, Los Angeles, March 7-11
American Road Builders Association, Public Auditorium, Cleveland..Jan. 9-13
Argentine .....Nov. 10-20
*Boston, Mechanics Bldg.....March 10-17
*Chicago, National Automobile Chamber of Commerce, Coliseum, Jan. 28-Feb. 4
International Aircraft Show, Berlin, March 23-April 11
Lille, France, Exposition....Nov. 20-Dec. 4
London Truck Show .....Nov. 17-26
Montevideo .....Nov. 19-27
National Standard Parts Association, Convention Hall, Cleveland..Nov. 14-18
*New York, National Automobile Chamber of Commerce, Grand Central Palace .....Jan. 7-14
Rio de Janeiro .....May 3-13
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 28-Feb. 4
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles .....Feb. 11-18
Salon, Automobile Salon, Inc., Hotel Commodore, New York..Nov. 27-Dec. 3
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco..Feb. 25-March 3

*Will have special shop equipment exhibit.

United States Good Roads Show, Des Moines .....May 28-June 1

CONVENTIONS

American Road Builders' Assn., Hotel Hollenden, Cleveland .....Jan. 9-13
American Road Builders' Association, Banquet, Hollenden Hotel, Cleveland .....Jan. 11
American Society of Mechanical Engineers, Annual Meeting, New York City .....Dec. 5-8
Automotive Equipment Association, Grand Hotel, Mackinac Island, June 10-16
National Association of Finance Companies, Congress Hotel, Chicago, Nov. 14-15
National Foreign Trade Council, Houston, Texas .....April 25-27
National Research Council, Washington, D. C. .....Dec. 1-2
National Standard Parts Association, Hotel Hollenden, Cleveland..Nov. 14-18
National Tire Dealers' Association, Brown Hotel, Louisville, Ky..Nov. 15-17
Overseas Automotive Club., Inc., Monthly Luncheon, Hotel Astor, New York .....Dec. 8
United States Good Roads Association and Bankhead National Highway Association, Des Moines.May 28-June 1
World Motor Transport Congress, London .....Nov. 14-17

N. A. D. A.

Chicago, Jan. 31-Feb. 2—Annual, Palmer House.
Chicago, Feb. 1—Banquet, Palmer House.
New York, Jan. 9-10—Eastern District, Hotel Commodore.

S. A. E.

National

Chicago, Dec. 1—Tractor Meeting.
Detroit, Jan. 24-27—Annual Meeting.
European trip—Nov. 2-Dec. 12.
New York, Jan. 12—Annual Dinner.

Sectional

Cleveland, Nov. 14—Lacquer Surfaces—Construction, Adaptability and Use—Dr. C. D. Holley.
Detroit, Nov. 21—Inspection trip through U. S. Rubber Co. Production Progress and Tire Simplification—B. J. Lemon.
Pennsylvania, Nov. 15—Recent Developments in Connection with Engine Lubrication—R. E. Wilson.